

Airwell

Service Manual

HAD DCI Series

Indoor Units	Outdoor Units
<i>HAD007</i>	<i>GC 7 DCI</i>
<i>HAD009</i>	<i>GC 9 DCI</i>
	<i>GCD009</i>
<i>HAD012</i>	<i>GC 12 DCI</i>
	<i>GCD012</i>
<i>HAD018</i>	<i>GC 18 DCI</i>
<i>HAD022</i>	<i>GC 21 DCI</i>
<i>HAD024</i>	<i>GC 24 DCI</i>



REFRIGERANT

R410A

HEAT PUMP

SM HADDI 1-A.2 GB

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**Photos are not contractual

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1. INTRODUCTION

1.1 General

The new **HAD** DC Inverter series is split wall mounted type indoor unit.

It has innovative flat design with background display and range comprise the following RC (heat pump) models:

- **HAD007**
- **HAD018**
- **HAD009**
- **HAD022**
- **HAD012**
- **HAD024**

The indoor **HAD** units are available as LED display types only, featuring esthetic design, compact dimensions, and low noise operation.

1.2 Main Features

The **HAD** series benefits from the most advanced innovations, namely:

- Innovative flat panel.
- Background display.
- Networking system connectivity.
- DC Inverter Technology / R410A refrigerant.
- High COP, Energy efficiency class A in cooling mode for all models.
- Advanced display on indoor unit with a backlit display, displaying the temperature and failure code in technical mode.
- Unique glossy design indoor unit.
- Infrared remote control.
- Indoor large diameter cross flow fan, allowing low operation sound level.
- Bended indoor coil with treated aluminum fins and coating for improved efficiency.
- Cooling operation at outdoor temperature down to -10°C.
- Heating operation at outdoor temperature down to -15°C.
- Automatic treated air sweep.
- Indoor units can be matched to mono and multi splits.
- Easy installation and service.
- Up to 15m pipe length between indoor and outdoor units.
- Up to 10m vertical high between indoor and outdoor units.
- Advanced micro processor control.
- Refrigerant pipe can be connected to the indoor unit from 4 different optional directions.

1.3 Indoor Unit

The indoor unit is a wall mounted type, and can be easily fitted to many types of residential and commercials applications.

It includes:

- Casing with air inlet and outlet grills.
- A large-diameter tangential fan.
- Bended coil with treated aluminum fins.
- Motorized flaps.
- Variable Speed motor (PG).
- Advanced electronic control box assembly.
- Interconnecting wiring terminal block.
- Mounting plate.

1.4 Filtration

The **HAD** series presents several types of air filters:

- Easily accessible, and re-usable pre-filters (mesh).
- New special filter: Nm photo catalyst + biological anti bacterial.

1.5 Control

The microprocessor indoor controller, and an infrared remote control, supplied as standard, provide complete operating function and programming. For further details please refer to the Operation Manual, Appendix A.

1.6 Outdoor Unit

The **HAD** outdoor units can be installed as floor or wall mounted units by using a wall supporting bracket. The metal sheets are protected by anti- corrosion paint work allowing long life resistance. All outdoor units are pre-charged. For further information please refer to the Product Data Sheet, Chapter 2.

It includes :

- Compressor mounted in a soundproofed compartment

Single DC Rotary => for GC 7 DCI, GC 9 DCI / GCD009, GC 12 DCI / GCD012

- Axial fan.
- Outdoor coil with hydrophilic louver fins.
- Outlet air fan grill.
- Outdoor advanced controller.
- 2 speed AC motor.
- Service valves “flare” type connection.
- Interconnecting wiring terminal block.

1.7 Tubing Connections

Flare type interconnecting tubing to be produced on site.

For further details please refer to the Installation Manual, Outdoor Chapter 9.

1.8 Accessories

RCW Wall Mounted Remote Control

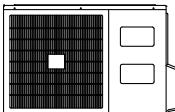
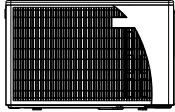
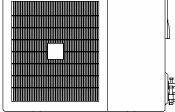
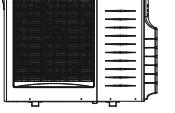
The RCW remote control is mounted on the wall (RC-2), and controls the unit either as an infrared remote control or as a wired controller. The wired controller can control up to 10 Indoor units with the same program settings and adjustments.

For further details please refer to Optional Accessories, Chapter 18.

1.9 Inbox Documentation

Each unit is supplied with its own installation and operation manuals one remote control manual.

1.10 Matching Table

OUTDOOR UNITS		REFR ¹⁾	INDOOR UNITS					
MODEL	GC 7 DCI		HAD007	HAD009	HAD012	HAD018	HAD022	HAD024
	GC 7 DCI	R410A	✓					
	GC 9 DCI			✓				
	GCD009			✓				
	GC 12 DCI				✓			
	GCD012				✓			
	GC 18 DCI					✓		
	GC 21 DCI						✓	
	GC 24 DCI							✓

2. PRODUCT DATA SHEET

2.1 HAD007 / GC 7 WDI DCI

Model Indoor Unit			HAD007			
Model Outdoor Unit			GC 7 WDI DCI			
Installation Method of Pipe			Flared			
Characteristics	Units	Cooling	Heating			
Capacity ⁽¹⁾	Btu/hr	7500(4440-9200)	7500(5110-11250)			
	kW	2.2(1.3-2.7)	2.2(1.5-3.3)			
Power input ⁽¹⁾	kW	0.65	0.61			
EER (Cooling) or COP(Heating) ⁽¹⁾	W/W	3.40	3.61			
Energy efficiency class		A	A			
Power supply	V/Ph/Hz	220-240 / 1 / 50				
Rated current	A	3.0	3.3			
Starting current	A	10.5				
Circuit breaker rating	A	10				
INDOOR						
Fan type & quantity			Crossflow x 1			
Fan speeds	H/M/L	RPM	1100/950/800			
Air flow ⁽²⁾	H/M/L	m3/hr	400/350/300			
External static pressure	Min-Max	Pa	0			
Sound power level ⁽³⁾	H/M/L	dB(A)	49/46/43			
Sound pressure level ⁽⁴⁾	H/M/L	dB(A)	36/32/27			
Moisture removal	l/hr	0.9				
Condensate drain tube I.D	mm	16				
Dimensions	WxHxD	mm	680 x250 X188			
Weight	kg	7				
Package dimensions	WxHxD	mm	740x320x265			
Packaged weight	kg	10				
Units per pallet	units	36 units per pallet				
Stacking height	units	9 levels				
OUTDOOR						
Refrigerant control			EEV			
Compressor type,model			Rotary, Panasonic 5RS092XDJ01			
Fan type & quantity			Propeller(direct) x 1			
Fan speeds	H/L	RPM	770			
Air flow	H/L	m3/hr	1400			
Sound power level	H/L	dB(A)	64			
Sound pressure level ⁽⁴⁾	H/L	dB(A)	54			
Dimensions	WxHxD	mm	760x245x545			
Weight	kg	35				
Package dimensions	WxHxD	mm	880x310x610			
Packaged weight	kg	38				
Units per pallet	Units	12 units per pallet				
Stacking height	units	3 levels				
Refrigerant type		R410A				
Refrigerant chargless distance	kg/m	0.7kg/7.5m				
Additional charge per 1 meter	g/m	No need				
Connections between units	Liquid line	In.(mm)	1/4"(6.35)			
	Suction line	In.(mm)	3/8"(9.53)			
	Max.tubing length	m.	Max.15			
	Max.height difference	m.	Max.10			
Operation control type		Remote control				
Heating elements	kW					
Others						

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.2 HAD009 / GC 9 WDI DCI

Model Indoor Unit			HAD009	
Model Outdoor Unit			GC 9 WDI DCI	
Installation Method of Pipe			Flared	
Characteristics	Units		Cooling	Heating
Capacity ⁽¹⁾	Btu/hr		8530(4440-10240)	8530(4432-11270)
	kW		2.5(1.1-3.1)	2.5(1.3-3.6)
Power input ⁽¹⁾	kW		0.73	0.69
EER (Cooling) or COP(Heating) ⁽¹⁾	W/W		3.41	3.61
Energy efficiency class			A	A
Power supply	V/Ph/Hz		220-240 / 1 / 50	
Rated current	A		3.2	3.1
Starting current	A		10.5	
Circuit breaker rating	A		10	
Fan type & quantity			Crossflow x 1	
Fan speeds	H/M/L	RPM	1150/950/800	
Air flow ⁽²⁾	H/M/L	m3/hr	420/350/270	
External static pressure	Min-Max	Pa	0	
Sound power level ⁽³⁾	H/M/L	dB(A)	52/48/45	
Sound pressure level ⁽⁴⁾	H/M/L	dB(A)	39/35/29	
Moisture removal	l/hr		1	
Condensate drain tube I.D	mm		16	
Dimensions	WxHxD	mm	680 x250 X188	
Weight	kg		7	
Package dimensions	WxHxD	mm	740x320x265	
Packaged weight	kg		10	
Units per pallet	units		36 units per pallet	
Stacking height	units		9 levels	
Refrigerant control			EEV	
Compressor type,model			Rotary, Panasonic 5RS092XDJ01	
Fan type & quantity			Propeller(direct) x 1	
Fan speeds	H/L	RPM	760	
Air flow	H/L	m3/hr	1390	
Sound power level	H/L	dB(A)	64	
Sound pressure level ⁽⁴⁾	H/L	dB(A)	54	
Dimensions	WxHxD	mm	760x245x545	
Weight	kg		36	
Package dimensions	WxHxD	mm	880x310x610	
Packaged weight	kg		39	
Units per pallet	Units		12 units per pallet	
Stacking height	units		3 levels	
Refrigerant type			R410A	
Refrigerant chargless distance	kg/m		0.85kg/7.5m	
Additional charge per 1 meter	g/m		No need	
Connections between units	Liquid line	In.(mm)	1/4"(6.35)	
	Suction line	In.(mm)	3/8"(9.53)	
	Max.tubing length	m.	Max.15	
	Max.height difference	m.	Max.10	
Operation control type			Remote control	
Heating elements	kW			
Others				

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.3 HAD009 / GCD009 DCI

Model Indoor Unit			HAD009 DCI	
Model Outdoor Unit			GCD 009 R410A	
Installation Method of Pipe			Flared	
Characteristics		Units	Cooling	Heating
Capacity ⁽⁴⁾		Btu/hr	8530(2730-10240)	8530(3410-10920)
		kW	2.5(0.8-3.0)	2.5(1.0-3.2)
Power input ⁽⁴⁾		kW	0.78(0.30-1.00)	0.69(0.37-0.90)
EER (Cooling) or COP(Heating) ⁽⁴⁾		W/W	3.21	3.61
Energy efficiency class			A	A
		V	220-240	
Power supply		Ph	1	
		Hz	50	
Rated current		A	3.5	3.1
Power factor			0.97	0.97
Prated (IDU)		W	25	
Prated (IDU+ODU)		W	1400	
Starting current		A	10.5	
Circuit breaker rating		A	10	
INDOOR	Fan type & quantity			Crossflow x 1
	Fan speeds	H/M/L	RPM	1150/1000/800
	Air flow ⁽¹⁾	H/M/L	m3/hr	420/350/270
	External static pressure	Min	Pa	0
	Sound power level ⁽²⁾	H/M/L	dB(A)	54
	Sound pressure level ⁽³⁾	H/M/L	dB(A)	40/35/29
	Moisture removal	l/hr		1.0
	Condensate drain tube I.D	mm		16
	Dimensions	WxHxD	mm	680 x250 X188
	Net Weight		kg	7
	Package dimensions	WxHxD	mm	740x310x248
	Packaged weight		kg	10
	Units per pallet		units	32
	Stacking height		units	8
OUTDOOR	Refrigerant control			Capillary
	Compressor type,model			Rotary, Toshiba, DA89X1C-20FZ3
	Fan type & quantity			Propeller(direct) x 1
	Fan speeds	H	RPM	830
	Air flow	H	m3/hr	1460
	Sound power level	H	dB(A)	65
	Sound pressure level ⁽³⁾	H	dB(A)	55
	Dimensions	WxHxD	mm	760x545x245
	Net Weight		kg	31
	Package dimensions	WxHxD	mm	880x610x310
	Packaged weight		kg	33
	Units per pallet		Units	12 units per pallet
	Stacking height		units	3 levels
	Refrigerant type			R410A
Connections between units	Scharg	kg(7.5m)		0.7
	Additional charge		L≤10m:+0g	10L ≤15m:+200g
	Liquid line	In.(mm)	1/4"(6.35)	
	Suction line	In.(mm)	3/8"(9.53)	
	Max.tubing length	m.	Max. 15	
Others	Max.height difference	m.	Max. 10	
	Operation control type		Remote control	
	Heating elements (Option)	kW		

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.4 HAD012 / GC 12 WDI DCI

Model Indoor Unit			HAD012	
Model Outdoor Unit			GC 12 WDI DCI	
Installation Method of Pipe			Flared	
Characteristics	Units	Cooling	Heating	
Capacity ⁽¹⁾	Btu/hr	11940(4440-13990)	11940 (5800-13990)	
	kW	3.5(1.3-4.1)	3.6(1.7-4.1)	
Power input ⁽¹⁾	kW	1.0	0.97	
EER (Cooling) or COP(Heating) ⁽¹⁾	W/W	3.5	3.61	
Energy efficiency class		A	A	
Power supply	V/Ph/Hz	220-240 / 1 / 50		
Rated current	A	4.6	4.3	
Starting current	A	10.5		
Circuit breaker rating	A	15		
INDOOR	Fan type & quantity			Crossflow x 1
	Fan speeds	H/M/L	RPM	1150/950/750
	Air flow ⁽²⁾	H/M/L	m3/hr	550/450/350
	External static pressure	Min-Max	Pa	0
	Sound power level ⁽³⁾	H/M/L	dB(A)	52/46/42
	Sound pressure level ⁽⁴⁾	H/M/L	dB(A)	40/34/28
	Moisture removal	l/hr		1.5
	Condensate drain tube I.D	mm		16
	Dimensions	WxHxD	mm	840x250x188
	Weight	kg		8
	Package dimensions	WxHxD	mm	930x320x265
	Packaged weight	kg		11
	Units per pallet	units	36 units per pallet	
	Stacking height	units	9 levels	
	Refrigerant control			EEV
OUTDOOR	Compressor type,model			Rotary, Panasonic 5RS102XAB
	Fan type & quantity			Propeller(direct) x 1
	Fan speeds	H/L	RPM	830
	Air flow	H/L	m3/hr	1460
	Sound power level	H/L	dB(A)	65
	Sound pressure level ⁽⁴⁾	H/L	dB(A)	55
	Dimensions	WxHxD	mm	760x245x545
	Weight	kg		37
	Package dimensions	WxHxD	mm	880x310x610
	Packaged weight	kg		40
	Units per pallet	Units	12 units per pallet	
	Stacking height	units	3 levels	
	Refrigerant type			R410A
	Refrigerant chargless distance			1.0kg/7.5m
	Additional charge per 1 meter			No need
Connections between units	Liquid line	In.(mm)	1/4"(6.35)	
	Suction line	In.(mm)	3/8"(9.53)	
	Max.tubing length	m.	Max.15	
	Max.height difference	m.	Max.10	
Operation control type			Remote control	
Heating elements			kW	No
Others				

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.5 HAD012 / GCD012

Model Indoor Unit		HAD012 DCI	
Model Outdoor Unit		GCD 012 R410A	
Installation Method of Pipe		Flared	
Characteristics	Units	Cooling	Heating
Capacity ⁽⁴⁾	Btu/hr	11940(3070-13650)	11940(4090-14330)
	kW	3.5(0.90-4.0)	3.5(1.2-4.2)
Power input ⁽⁴⁾	kW	1.09(0.33-1.50)	0.97(0.45-1.30)
EER (Cooling) or COP(Heating) ⁽⁴⁾	W/W	3.21	3.61
Energy efficiency class		A	A
	V	220-240	
Power supply	Ph	1	
	Hz	50	
Rated current	A	4.9	4.3
Power factor		0.97	0.97
Prated (IDU)	W	30	
Prated (IDU+ODU)	W	1500	
Starting current	A	10.5	
Circuit breaker rating	A	15	
INDOOR	Fan type & quantity		Crossflow x 1
	Fan speeds	H/M/L	RPM
	Air flow ⁽¹⁾	H/M/L	m3/hr
	External static pressure	Min	Pa
	Sound power level ⁽²⁾	H/M/L	dB(A)
	Sound pressure level ⁽³⁾	H/M/L	dB(A)
	Moisture removal	l/hr	1.5
	Condensate drain tube I.D	mm	16
	Dimensions	WxHxD	mm
	Net Weight	kg	8
	Package dimensions	WxHxD	mm
	Packaged weight	kg	11
	Units per pallet	units	32
	Stacking height	units	8
OUTDOOR	Refrigerant control		Capillary
	Compressor type,model		Rotary, Toshiba, DA108X1C-20FZ3
	Fan type & quantity		Propeller(direct) x 1
	Fan speeds	H	RPM
	Air flow	H	m3/hr
	Sound power level	H	dB(A)
	Sound pressure level ⁽³⁾	H	dB(A)
	Dimensions	WxHxD	mm
	Net Weight	kg	32
	Package dimensions	WxHxD	mm
	Packaged weight	kg	34
	Units per pallet	Units	12 units per pallet
	Stacking height	units	3 levels
	Refrigerant type		R410A
Connections between units	Scharg	kg(7.5m)	0.95
	Additional charge		L≤10m:+0g 10L≤15m:+200g
	Liquid line	In.(mm)	1/4"(6.35)
	Suction line	In.(mm)	3/8"(9.53)
	Max.tubing length	m.	Max. 15
	Max.height difference	m.	Max. 10
Operation control type		Remote control	
Heating elements (Option)		kW	No
Others			

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.6 HAD018 / GC 18 DCI

Model Indoor Unit			HAD018 DCI
Model Outdoor Unit			GC 18 R410A
Installation Method of Pipe			Flared
Characteristics		Units	Cooling Heating
Capacity ⁽⁴⁾	Btu/hr	17060(5120-20470)	20470(5120-25930)
	kW	5.00(1.50-6.00)	6.00(1.50-7.60)
Power input ⁽⁴⁾	kW	1.46(0.50-2.00)	1.66(0.45-2.20)
EER (Cooling) or COP(Heating) ⁽⁴⁾	W/W	3.42	3.61
Energy efficiency class		A	A
Power supply	V	220-240	
	Ph	Single	
	Hz	50	
Rated current	A	6.5	7.4
Power factor		0.97	0.97
Prated (IDU)	W	56	
Prated (IDU+ODU)	W	2200	
Starting current	A	10.5	
Circuit breaker rating	A	20	
INDOOR			Crossflow x 1
Fan type & quantity			
Fan speeds	H/M/L	RPM	1200/1050/900
Air flow ⁽¹⁾	H/M/L	m3/hr	850/700/550
External static pressure	Min	Pa	0
Sound power level ⁽²⁾	H/M/L	dB(A)	58/54/50
Sound pressure level ⁽³⁾	H/M/L	dB(A)	44/39/34
Moisture removal	l/hr		2
Condensate drain tube I.D	mm		16
Dimensions	WxHxD	mm	1060x295x221
Net Weight	kg		15
Package dimensions	WxHxD	mm	1125x360x295
Packaged weight	kg		18
Units per pallet	units		16
Stacking height	units		8 levels
OUTDOOR			
Refrigerant control			EEV
Compressor type,model			Scroll,Panasonic 5CS130XCC03
Fan type & quantity			Propeller(direct) x 1
Fan speeds	H	RPM	920
Air flow	H	m ³ /hr	2160
Sound power level	H	dB(A)	63
Sound pressure level ⁽³⁾	H	dB(A)	53
Dimensions	WxHxD	mm	795x610x290
Net Weight	kg		39
Package dimensions	WxHxD	mm	945x655x395
Packaged weight	kg		43
Units per pallet	Units		9
Stacking height	units		3 levels
Refrigerant type			R410A
Standard charge	kg(7.5m)		1.50kg
Additional charge			No need
Connections between units	Liquid line	In.(mm)	1/4"(6.35)
	Suction line	In.(mm)	1/2"(12.7)
	Max.tubing length	m.	30
	Max.height difference	m.	10
Operation control type			Remote control
Heating elements (Option)	kW		
Others			

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.7 HAD022 / GC 21

Model Indoor Unit			HAD022 DCI	
Model Outdoor Unit			GC 21 R410A	
Installation Method of Pipe			Flared	
Characteristics	Units	Cooling	Heating	
Capacity ⁽⁴⁾	Btu/hr	20470(5120-22860)	22180(6140-26950)	
	kW	6.00(1.50-6.70)	6.50(1.80-7.90)	
Power input ⁽⁴⁾	kW	1.99(0.50-2.20)	1.90(0.45-2.30)	
EER (Cooling) or COP(Heating) ⁽⁴⁾	W/W	3.02	3.42	
Energy efficiency class		B	B	
	V	220-240		
Power supply	Ph	Single		
	Hz	50		
Rated current	A	8.9	8.5	
Power factor		0.97	0.97	
Prated (IDU)	W	59		
Prated (IDU+ODU)	W	2300		
Starting current	A	10.5		
Circuit breaker rating	A	20		
INDOOR	Fan type & quantity		Crossflow x 1	
	Fan speeds	H/M/L	RPM	1250/1100/1000
	Air flow ⁽¹⁾	H/M/L	m3/hr	900/760/620
	External static pressure	Min	Pa	0
	Sound power level ⁽²⁾	H/M/L	dB(A)	59/55/52
	Sound pressure level ⁽³⁾	H/M/L	dB(A)	44/40/37
	Moisture removal	l/hr		2
	Condensate drain tube I.D	mm		16
	Dimensions	WxHxD	mm	1060x295x221
	Net Weight	kg		15
	Package dimensions	WxHxD	mm	1125x360x295
	Packaged weight	kg		18
	Units per pallet	units		16
	Stacking height	units		8 levels
	Refrigerant control		EEV	
OUTDOOR	Compressor type,model		Scroll,Panasonic 5CS130XCC03	
	Fan type & quantity		Propeller(direct) x 1	
	Fan speeds	H	RPM	820
	Air flow	H	m3/hr	2860
	Sound power level	H	dB(A)	65
	Sound pressure level ⁽³⁾	H	dB(A)	55
	Dimensions	WxHxD	mm	846x690x302
	Net Weight	kg		46
	Package dimensions	WxHxD	mm	990x770x430
	Packaged weight	kg		50
	Units per pallet	Units		9
	Stacking height	units		3 levels
	Refrigerant type		R410A	
	Standard charge	kg(7.5m)		1.65kg
	Additional charge		No need	
Connections between units	Liquid line	In.(mm)	1/4"(6.35)	
	Suction line	In.(mm)	1/2"(12.7)	
	Max.tubing length	m.	30	
	Max.height difference	m.	10	
Operation control type			Remote control	
Heating elements (Option)			KW	
Others				

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

2.8 HAD024 / GC 24 DCI

Model Indoor Unit			HAD024 DCI	
Model Outdoor Unit			GC 24 R410A	
Installation Method of Pipe			Flared	
Characteristics	Units	Cooling	Heating	
Capacity ⁽⁴⁾	Btu/hr	23200(5120-25590)	24570(5120-30030)	
	kW	6.80(1.50-7.50)	7.05(1.50-8.80)	
Power input ⁽⁴⁾	kW	2.25(0.5-2.8)	2.15(0.45-3.0)	
EER (Cooling) or COP(Heating) ⁽⁴⁾	W/W	3.01	3.27	
Energy efficiency class		B	C	
	V	220-240		
Power supply	Ph	Single		
	Hz	50		
Rated current	A	10.0	9.6	
Power factor		0.97	0.97	
Prated (IDU)	W	60		
Prated (IDU+ODU)	W	3000		
Starting current	A	15		
Circuit breaker rating	A	20		
INDOOR	Fan type & quantity		Crossflow x 1	
	Fan speeds	H/M/L	RPM	1350/1150/1000
	Air flow ⁽¹⁾	H/M/L	m3/hr	960/800/670
	External static pressure	Min	Pa	0
	Sound power level ⁽²⁾	H/M/L	dB(A)	62/57/54
	Sound pressure level ⁽³⁾	H/M/L	dB(A)	47/42/38
	Moisture removal	l/hr		2.5
	Condensate drain tube I.D	mm		16
	Dimensions	WxHxD	mm	1060x295x221
	Net Weight	kg		15
	Package dimensions	WxHxD	mm	1125x360x295
	Packaged weight	kg		18
	Units per pallet	units		16
	Stacking height	units		8 levels
OUTDOOR	Refrigerant control		EEV	
	Compressor type,model		Two Rotary,Sanyo(Sheny) C-7RVN153H0W	
	Fan type & quantity		Propeller(direct) x 1	
	Fan speeds	H	RPM	850
	Air flow	H	m3/hr	3600
	Sound power level	H	dB(A)	66
	Sound pressure level ⁽³⁾	H	dB(A)	56
	Dimensions	WxHxD	mm	950x835x412
	Net Weight	kg		64.5
	Package dimensions	WxHxD	mm	1080x910x477
	Packaged weight	kg		72
	Units per pallet	Units		4
	Stacking height	units		2 levels
	Refrigerant type			R410A
Connections between units	Standard charge	kg(7.5m)		2.3kg
	Additional charge		7.5m<Length =S20m:+0g; 20m <Length ^30m:+300g	
	Liquid line	In.(mm)	3/8"(9.53)	
	Suction line	In.(mm)	5/8"(15.88)	
	Max.tubing length	m.	30	
	Max.height difference	m.	15	
Operation control type			Remote control	
Heating elements (Option)			kW	
Others				

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN 14511.

(2) Airflow in ducted units; at nominal external static pressure.

(3) Sound power in ducted units is measured at air discharge.

(4) Sound pressure level measured at 1 meter distance from unit.

3. RATING CONDITIONS

Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

Cooling:

Indoor: 27°C DB 19°C WB

Outdoor: 35 °C DB

Heating:

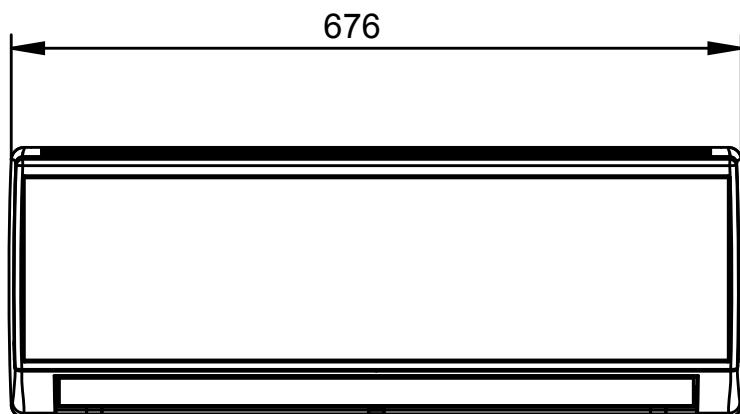
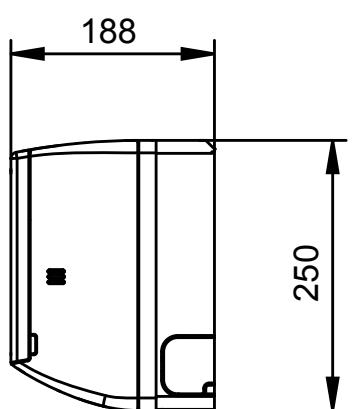
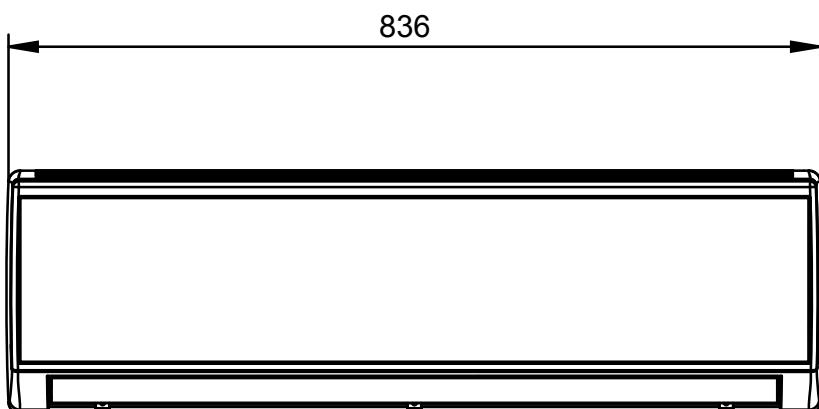
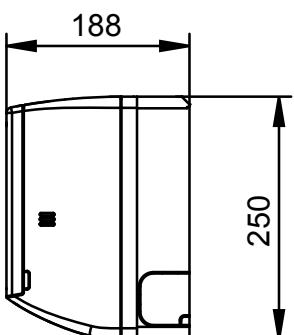
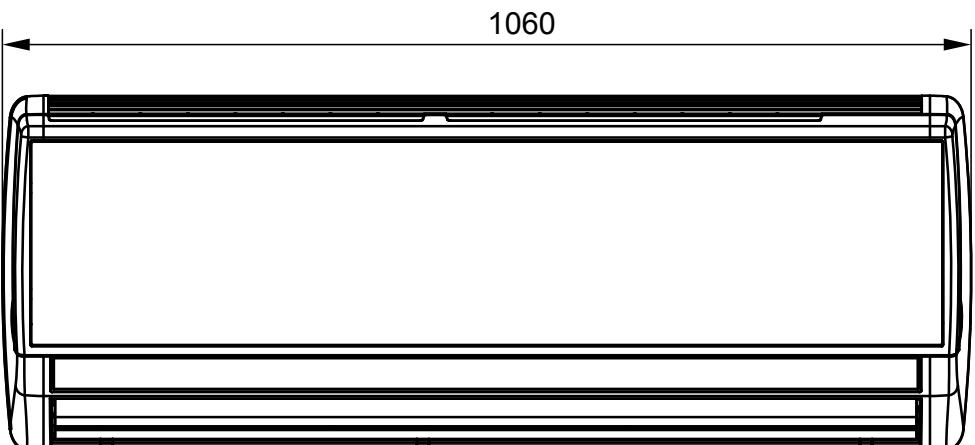
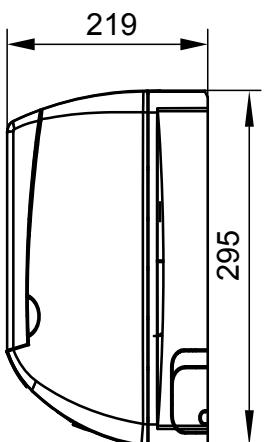
Indoor: 20°C DB

Outdoor: 7°C DB 6°C WB

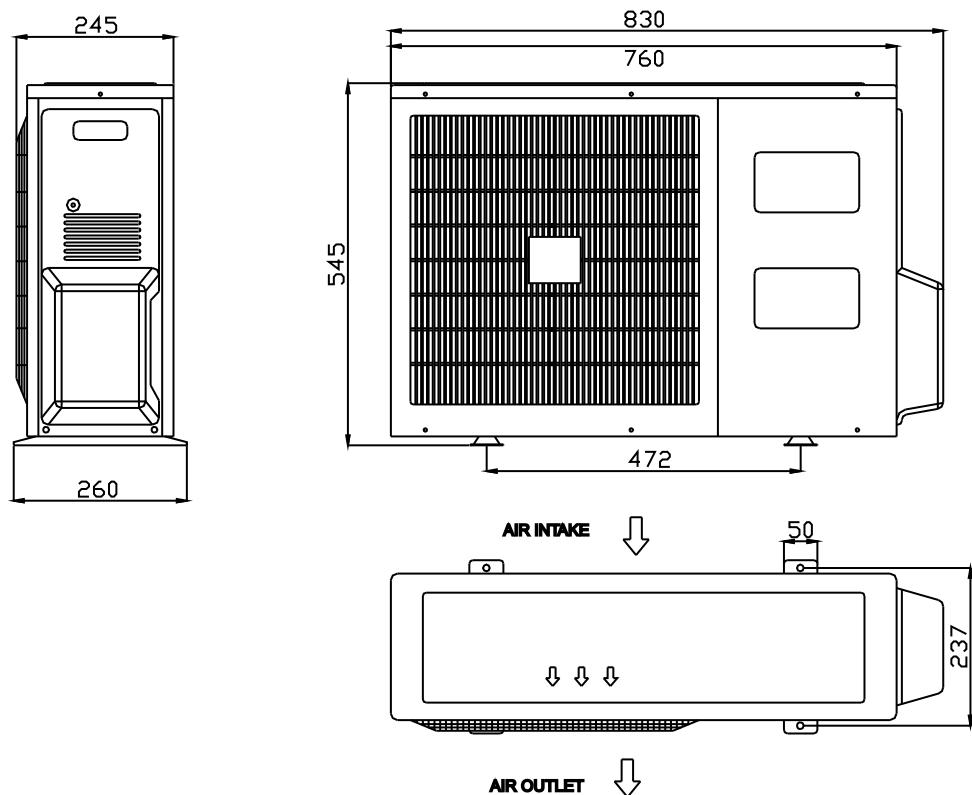
3.1 Operating Limits

3.1.1 R410A

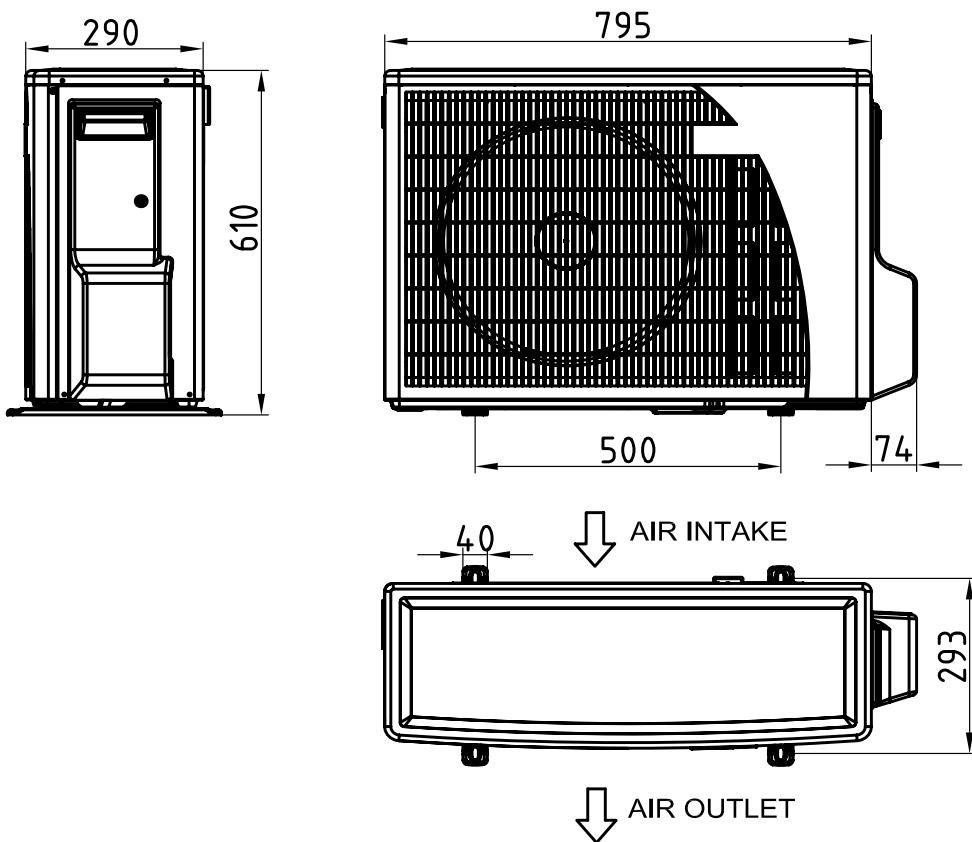
		Indoor	Outdoor
Cooling	Upper limit	32°C DB 23°C WB	46°C DB
	Lower limit	21°C DB 15°C WB	-10°C DB (0°C matching GCD)
Heating	Upper limit	27°C DB	24°C DB 18°C WB
	Lower limit	10°C DB	-15°C DB -16°C WB
Voltage		198 – 264 V	

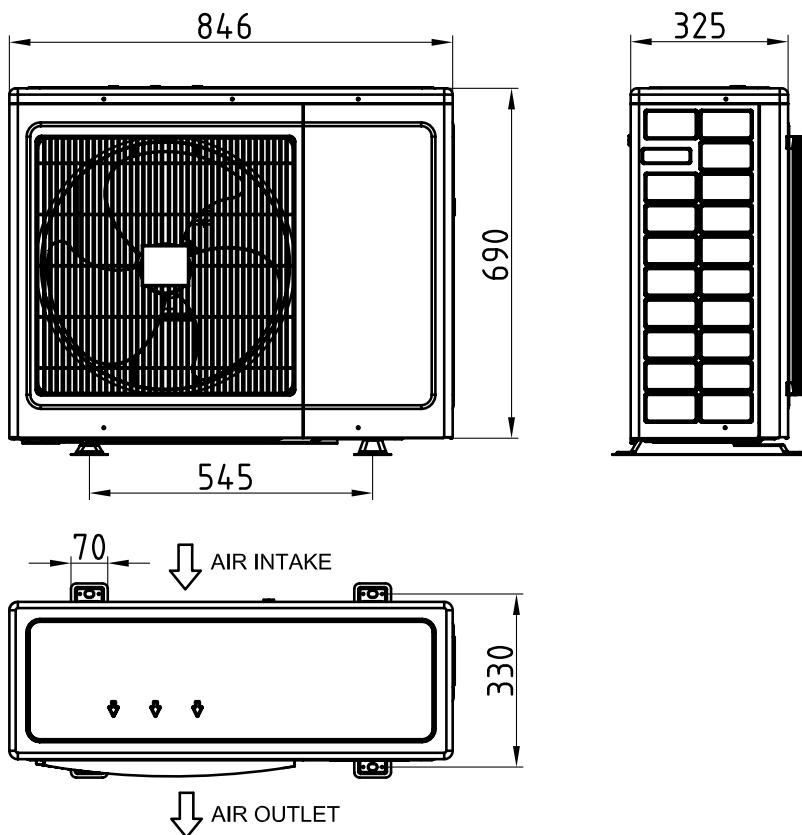
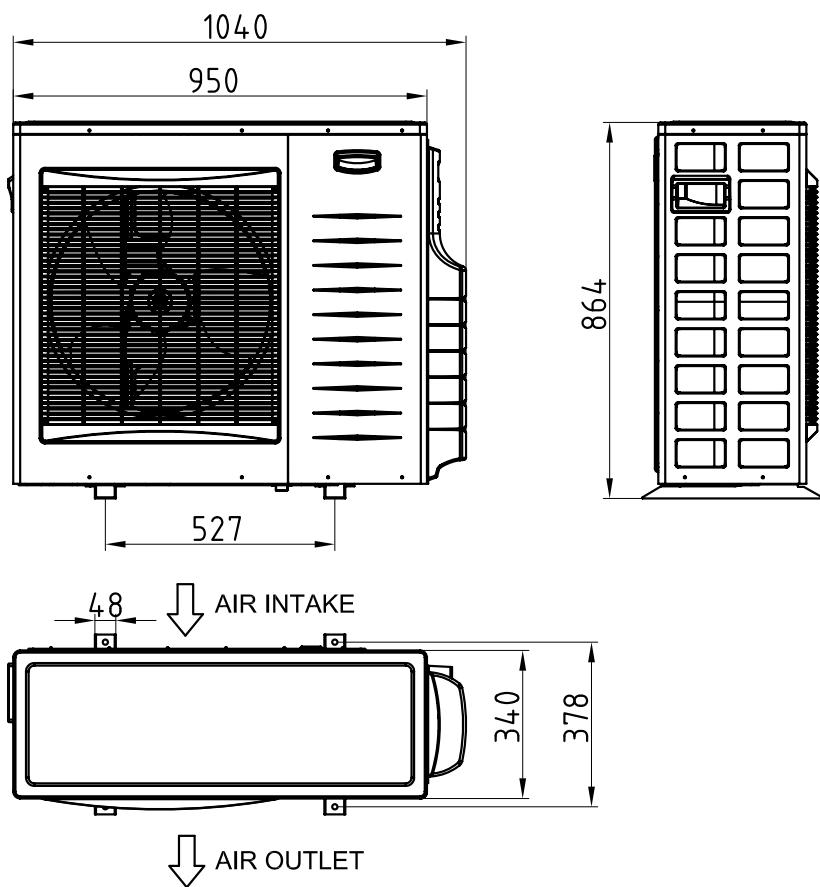
4. OUTLINE DIMENSIONS**4.1 Indoor Unit: HAD007, HAD009****4.2 Indoor Unit: HAD012****4.3 Indoor Unit: HAD018, HAD022, HAD024**

4.4 Outdoor Unit: GC 7, GC 9, GC 12, GCD009, GCD012



4.5 Outdoor Unit: GC 18



4.6 Outdoor Unit: GC 21**4.7 Outdoor Unit: GC 24**

5. PERFORMANCE DATA

5.1 HAD007 / GC 7 RC DCI

5.1.1 Cooling Capacity (kW) – Run Mode

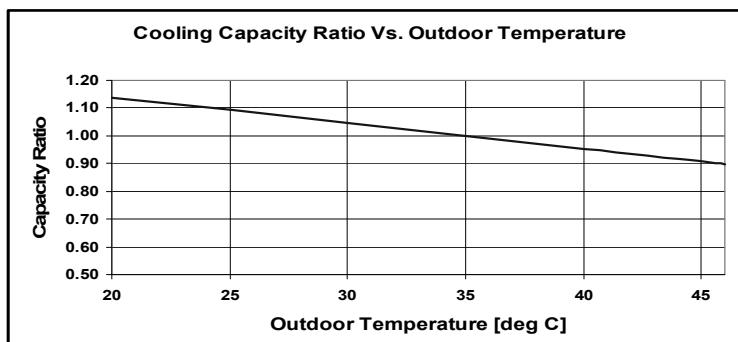
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.08	2.21	2.35	2.49	2.62
	SC	1.72	1.75	1.79	1.82	1.86
	PI	0.51	0.52	0.53	0.54	0.55
30	TC	1.98	2.11	2.25	2.39	2.52
	SC	1.67	1.71	1.74	1.78	1.81
	PI	0.57	0.58	0.59	0.60	0.61
35	TC	1.88	2.01	2.20	2.29	2.42
	SC	1.63	1.66	1.70	1.74	1.77
	PI	0.63	0.64	0.65	0.66	0.67
40	TC	1.78	1.91	2.05	2.19	2.32
	SC	1.59	1.62	1.66	1.69	1.73
	PI	0.69	0.70	0.71	0.72	0.73
46	TC	1.66	1.79	1.93	2.07	2.20
	SC	1.53	1.57	1.60	1.64	1.67
	PI	0.76	0.77	0.78	0.79	0.80

LEGEND

- TC – Total Cooling Capacity, kW
- SC – Sensible Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OD – Outdoor

5.1.2 Capacity Correction Factors

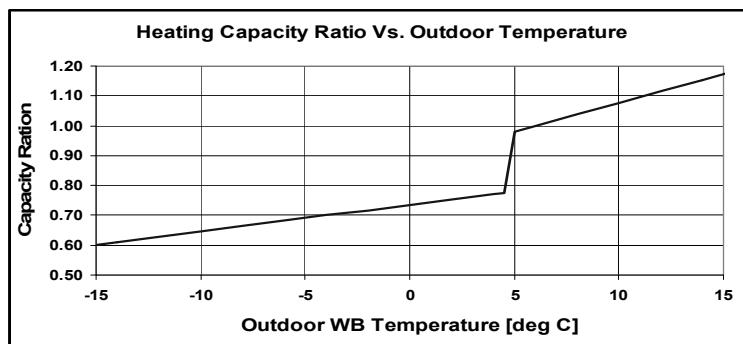


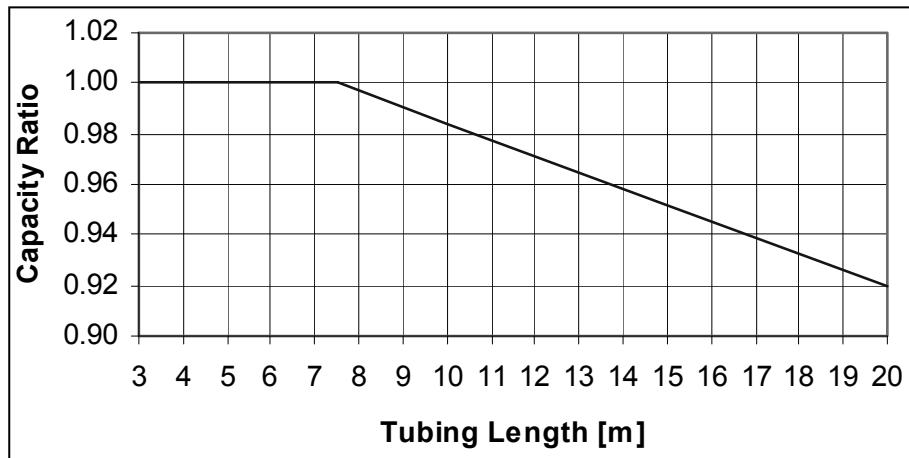
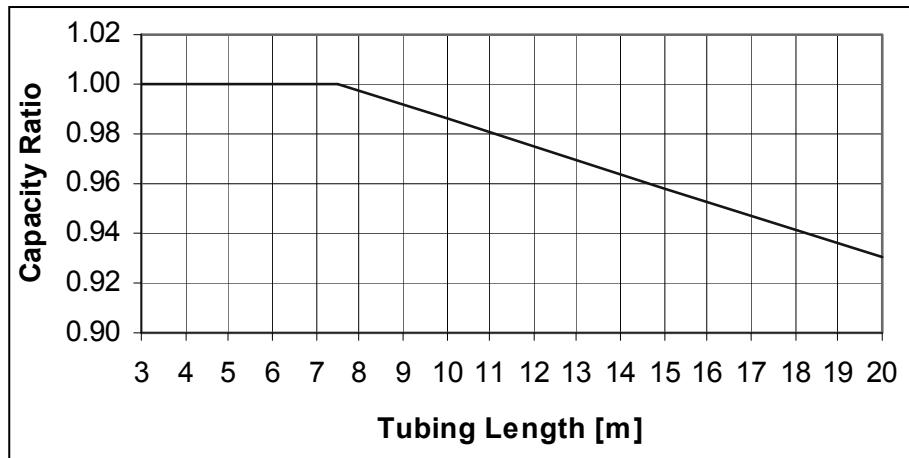
5.1.3 Heating Capacity (kW) - Run Mode**230[V] : Indoor Fan at High Speed.**

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	1.37	1.28	1.18
	PI	0.37	0.40	0.44
-10/-12	TC	1.53	1.43	1.34
	PI	0.44	0.48	0.52
-7/-8	TC	1.64	1.55	1.45
	PI	0.50	0.53	0.57
-1/-2	TC	1.70	1.61	1.51
	PI	0.53	0.56	0.60
2/1	TC	1.74	1.65	1.55
	PI	0.54	0.58	0.62
7/6	TC	2.25	2.20	2.06
	PI	0.57	0.61	0.65
10/9	TC	2.38	2.28	2.18
	PI	0.61	0.64	0.68
15/12	TC	2.50	2.40	2.31
	PI	0.64	0.68	0.72
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
 PI – Power Input, kW
 WB – Wet Bulb Temp., (°C)
 DB – Dry Bulb Temp., (°C)
 ID – Indoor
 OU – Outdoor

5.1.4 Capacity Correction Factors

5.1.5 Capacity Correction Factor Due to Tubing Length**5.1.5.1 Cooling****5.1.5.2 Heating**

5.2 HAD009 / GC 9 RC DCI

5.2.1 Cooling Capacity (kW) – Run Mode

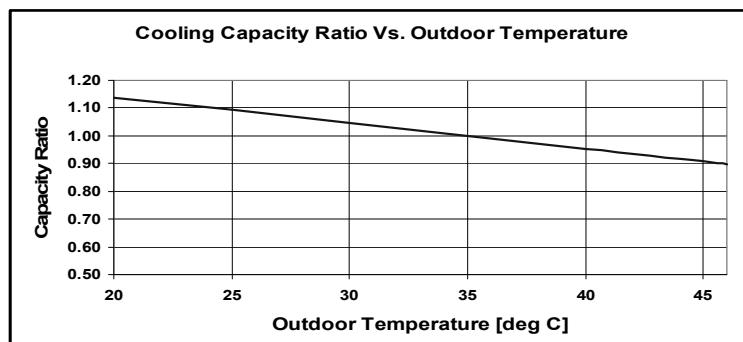
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.41	2.57	2.73	2.89	3.05
	SC	1.67	1.71	1.74	1.77	1.81
	PI	0.59	0.60	0.61	0.62	0.63
30	TC	2.30	2.46	2.62	2.77	2.93
	SC	1.63	1.67	1.70	1.73	1.77
	PI	0.66	0.67	0.68	0.69	0.70
35	TC	2.18	2.34	2.50	2.66	2.82
	SC	1.59	1.63	1.77	1.89	1.92
	PI	0.73	0.74	0.75	0.76	0.77
40	TC	2.07	2.23	2.39	2.54	2.70
	SC	1.55	1.59	1.62	1.65	1.69
	PI	0.80	0.81	0.82	0.83	0.84
46	TC	1.93	2.09	2.25	2.41	2.56
	SC	1.50	1.54	1.57	1.61	1.64
	PI	0.88	0.89	0.90	0.91	0.92

LEGEND

- TC – Total Cooling Capacity, kW
- SC – Sensible Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OD – Outdoor

5.2.2 Capacity Correction Factors



5.2.3 Heating Capacity (kW) - Run Mode

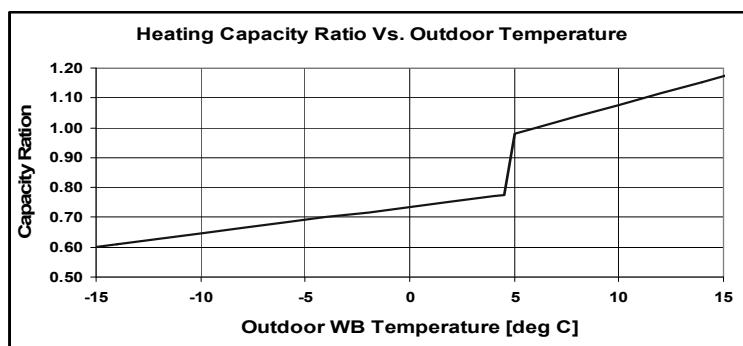
230[V] : Indoor Fan at High Speed.

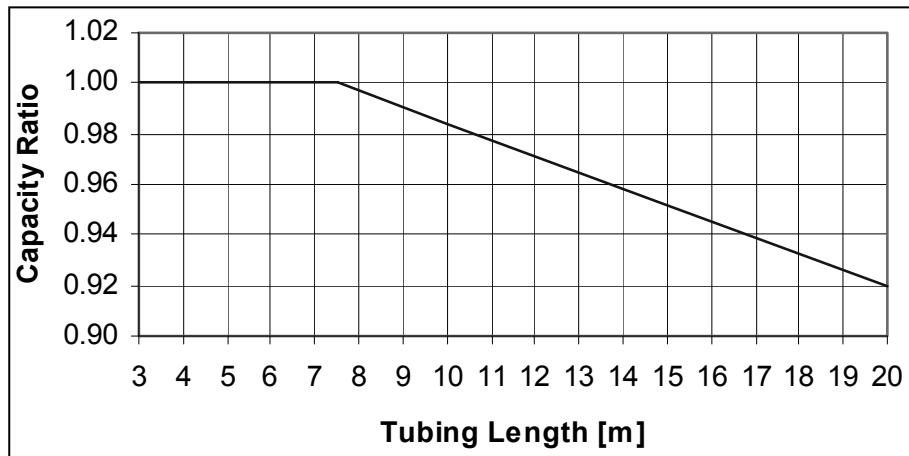
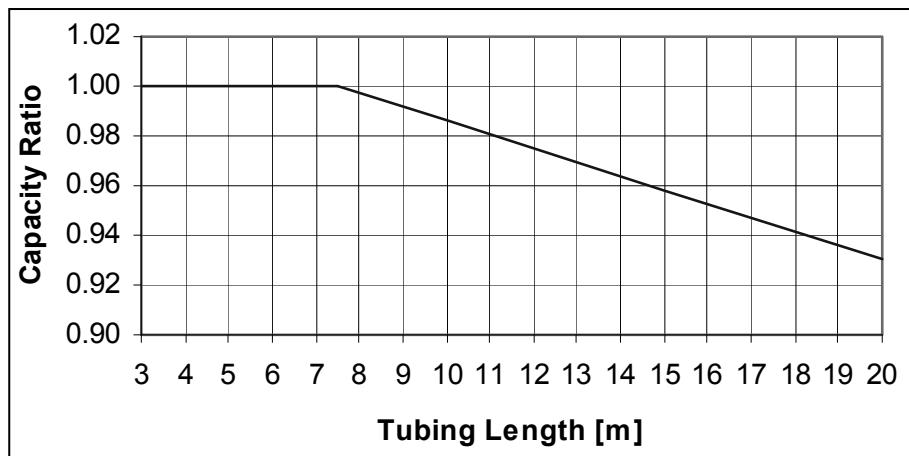
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	1.57	1.46	1.35
	PI	0.41	0.46	0.50
-10/-12	TC	1.74	1.63	1.52
	PI	0.50	0.54	0.58
-7/-8	TC	1.88	1.77	1.66
	PI	0.56	0.60	0.65
-1/-2	TC	1.94	1.83	1.72
	PI	0.59	0.64	0.68
2/1	TC	1.99	1.88	1.77
	PI	0.62	0.66	0.70
7/6	TC	2.57	2.50	2.35
	PI	0.65	0.69	0.73
10/9	TC	2.71	2.60	2.49
	PI	0.69	0.73	0.77
15/12	TC	2.85	2.74	2.63
	PI	0.73	0.77	0.81
(Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

- TC – Total Heating Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OU – Outdoor

5.2.4 Capacity Correction Factors



5.2.5 Capacity Correction Factor Due to Tubing Length**5.2.5.1 Cooling****5.2.5.2 Heating**

5.3 HAD012 / GC 12 RC DCI

5.3.1 Cooling Capacity (kW) - Run Mode

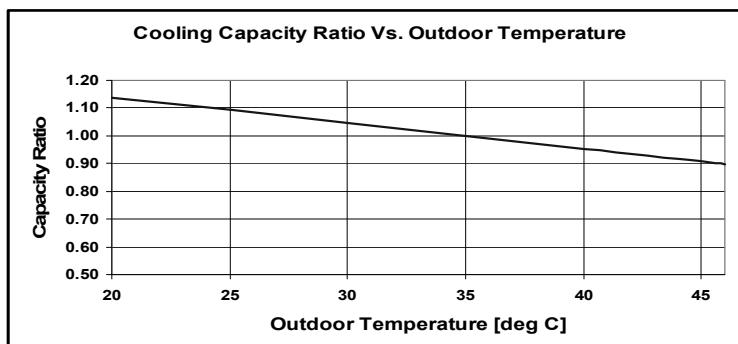
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	3.26	3.48	3.69	3.90	4.12
	SC	2.59	2.64	2.69	2.75	2.80
	PI	0.79	0.80	0.82	0.83	0.85
30	TC	3.11	3.32	3.53	3.75	3.96
	SC	2.52	2.58	2.63	2.68	2.73
	PI	0.88	0.89	0.91	0.92	0.94
35	TC	2.95	3.16	3.50	3.59	3.80
	SC	2.46	2.51	2.56	2.62	2.67
	PI	0.97	0.99	1.00	1.02	1.03
40	TC	2.79	3.01	3.22	3.43	3.65
	SC	2.39	2.44	2.50	2.55	2.60
	PI	1.06	1.08	1.09	1.11	1.12
46	TC	2.60	2.82	3.03	3.24	3.46
	SC	2.31	2.37	2.42	2.47	2.52
	PI	1.17	1.19	1.20	1.22	1.23

LEGEND

- TC – Total Cooling Capacity, kW
- SC – Sensible Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OD – Outdoor

5.3.2 Capacity Correction Factors

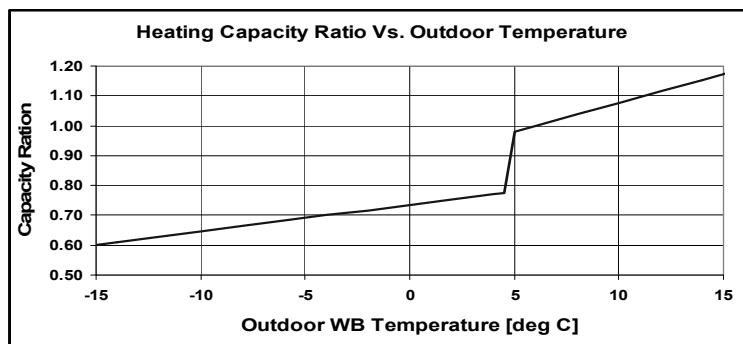


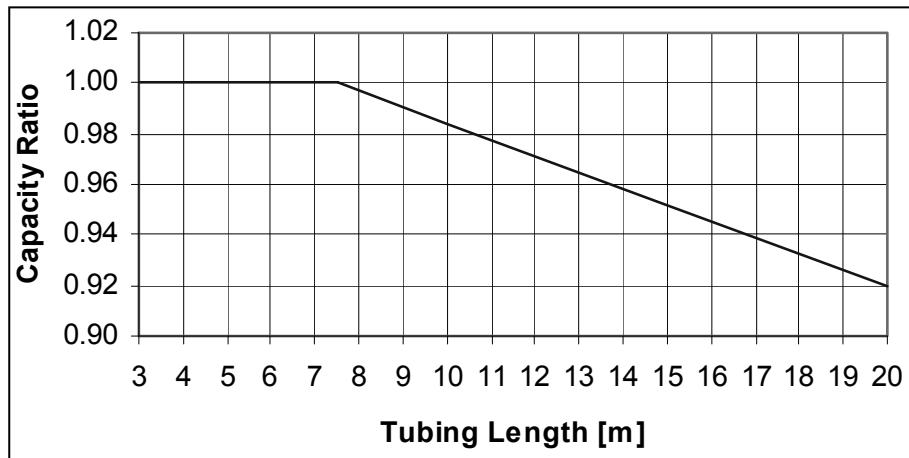
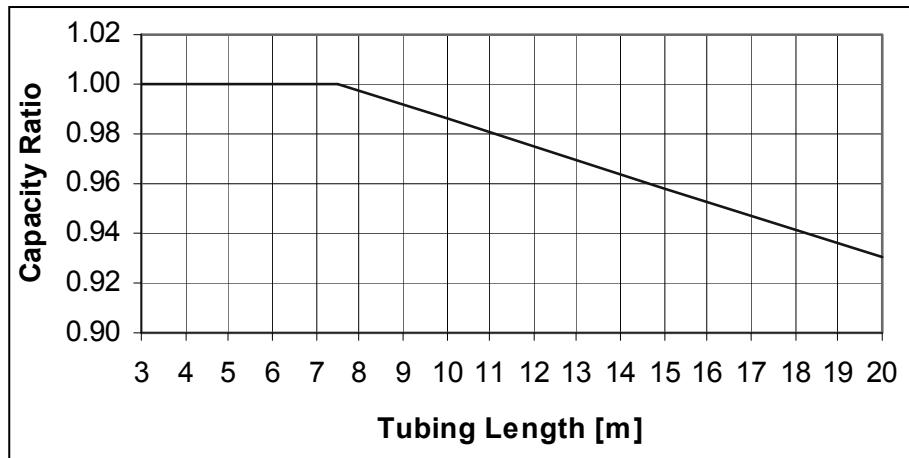
5.3.3 Heating Capacity (kW) - Run Mode**230[V] : Indoor Fan at High Speed.**

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	2.17	2.02	1.86
	PI	0.58	0.64	0.70
-10/-12	TC	2.41	2.26	2.11
	PI	0.70	0.76	0.82
-7/-8	TC	2.60	2.44	2.29
	PI	0.79	0.85	0.91
-1/-2	TC	2.69	2.54	2.38
	PI	0.84	0.90	0.95
2/1	TC	2.75	2.60	2.45
	PI	0.87	0.93	0.98
7/6	TC	3.56	3.60	3.25
	PI	0.91	0.97	1.03
10/9	TC	3.75	3.60	3.45
	PI	0.97	1.02	1.08
15/12	TC	3.95	3.80	3.64
	PI	1.02	1.08	1.14
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

LEGEND

- TC – Total Heating Capacity, kW
 PI – Power Input, kW
 WB – Wet Bulb Temp., (°C)
 DB – Dry Bulb Temp., (°C)
 ID – Indoor
 OU – Outdoor

5.3.4 Capacity Correction Factors

5.3.5 Capacity Correction Factor Due to Tubing Length**5.3.5.1 Cooling****5.3.5.2 Heating**

5.4 HAD009 / GCD009

5.4.1 Cooling Capacity (kW) – Run Mode

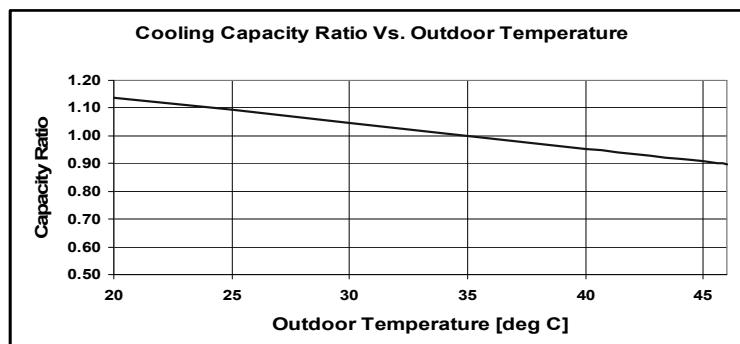
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.41	2.57	2.73	2.89	3.05
	SC	1.67	1.71	1.74	1.77	1.81
	PI	0.59	0.60	0.61	0.62	0.63
30	TC	2.30	2.46	2.62	2.77	2.93
	SC	1.63	1.67	1.70	1.73	1.77
	PI	0.66	0.67	0.68	0.69	0.70
35	TC	2.18	2.34	2.50	2.66	2.82
	SC	1.59	1.63	1.77	1.69	1.73
	PI	0.73	0.74	0.73	0.76	0.77
40	TC	2.07	2.23	2.39	2.54	2.70
	SC	1.55	1.59	1.62	1.65	1.69
	PI	0.80	0.81	0.82	0.83	0.84
46	TC	1.93	2.09	2.25	2.41	2.56
	SC	1.50	1.54	1.57	1.61	1.64
	PI	0.88	0.89	0.90	0.91	0.92

LEGEND

- TC – Total Cooling Capacity, kW
- SC – Sensible Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OD – Outdoor

5.4.2 Capacity Correction Factors



5.4.3 Heating Capacity (kW) - Run Mode

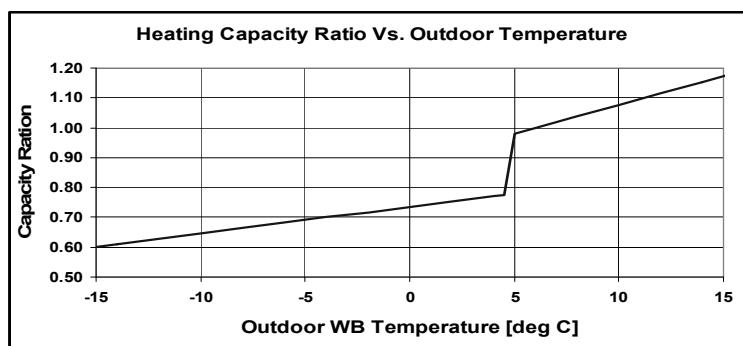
230[V] : Indoor Fan at High Speed.

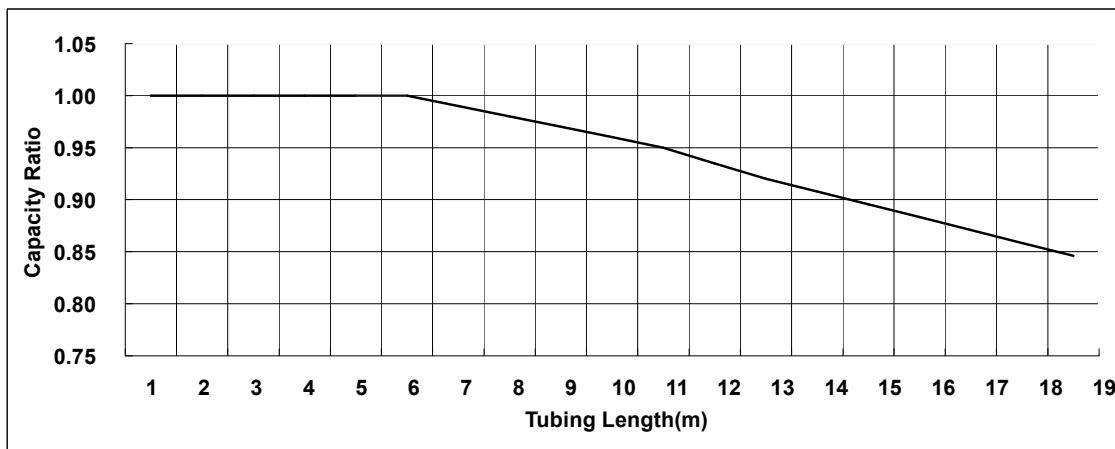
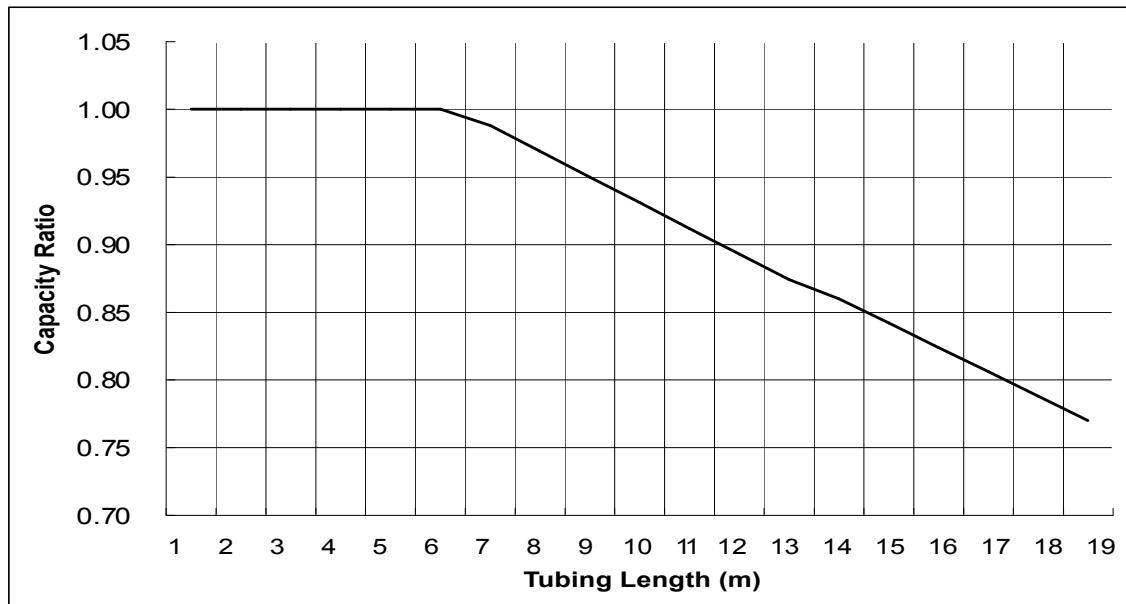
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	1.78	1.66	1.53
	PI	0.49	0.54	0.59
-10/-12	TC	1.98	1.86	1.73
	PI	0.59	0.64	0.69
-7/-8	TC	2.14	2.01	1.89
	PI	0.67	0.72	0.77
-1/-2	TC	2.21	2.09	1.96
	PI	0.71	0.76	0.81
2/1	TC	2.26	2.14	2.01
	PI	0.73	0.78	0.83
7/6	TC	2.92	2.50	2.68
	PI	0.77	0.69	0.87
10/9	TC	3.09	2.96	2.84
	PI	0.82	0.87	0.92
15/12	TC	3.25	3.12	3.00
	PI	0.86	0.91	0.96
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

LEGEND

- TC – Total Heating Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OU – Outdoor

5.4.4 Capacity Correction Factors



5.4.5 Capacity Correction Factor Due to Tubing Length**5.4.5.1 Cooling****5.4.5.2 Heating**

5.5 HAD012 / GCD012

5.5.1 Cooling Capacity (kW) – Run Mode

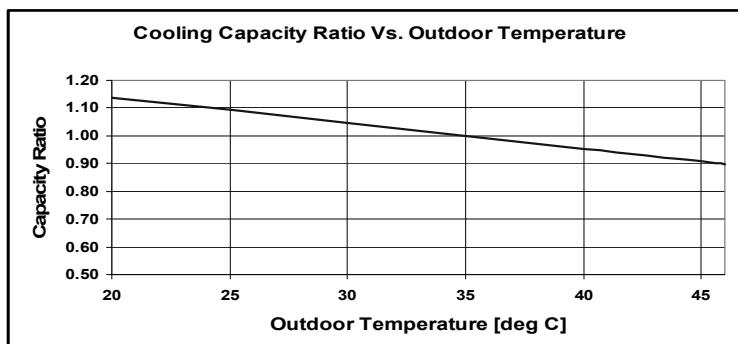
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	3.38	3.60	3.82	4.04	4.26
	SC	2.54	2.59	2.64	2.69	2.74
	PI	0.81	0.83	0.84	0.86	0.87
30	TC	3.22	3.44	3.66	3.88	4.10
	SC	2.48	2.53	2.58	2.63	2.68
	PI	0.90	0.92	0.94	0.95	0.97
35	TC	3.06	3.28	3.50	3.72	3.94
	SC	2.42	2.47	2.58	2.57	2.62
	PI	1.00	1.01	1.09	1.05	1.06
40	TC	2.90	3.12	3.34	3.56	3.78
	SC	2.36	2.41	2.46	2.51	2.56
	PI	1.09	1.11	1.12	1.14	1.16
46	TC	2.70	2.92	3.15	3.37	3.59
	SC	2.28	2.34	2.39	2.44	2.49
	PI	1.21	1.22	1.24	1.25	1.27

LEGEND

- TC – Total Cooling Capacity, kW
- SC – Sensible Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OD – Outdoor

5.5.2 Capacity Correction Factors

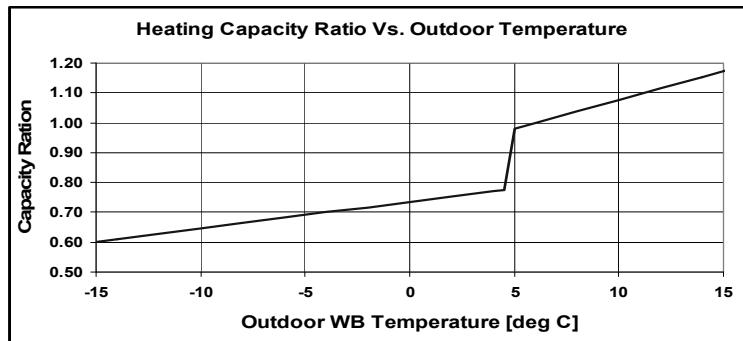


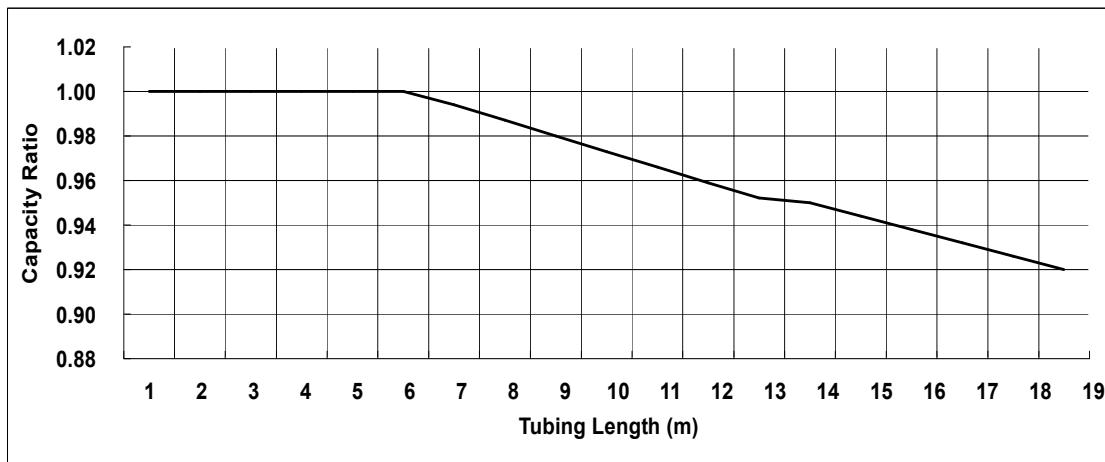
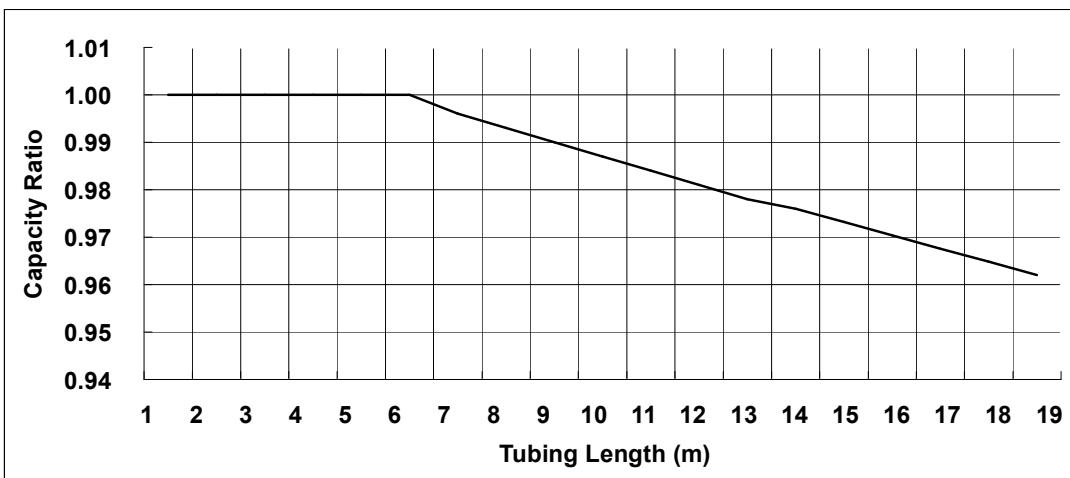
5.5.3 Heating Capacity (kW) - Run Mode**230[V] : Indoor Fan at High Speed.**

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	2.29	2.13	1.97
	PI	0.63	0.69	0.76
-10/-12	TC	2.55	2.39	2.23
	PI	0.76	0.82	0.89
-7/-8	TC	2.75	2.58	2.42
	PI	0.86	0.92	0.98
-1/-2	TC	2.84	2.68	2.52
	PI	0.91	0.97	1.03
2/1	TC	2.91	2.75	2.59
	PI	0.94	1.00	1.07
7/6	TC	3.76	3.50	3.44
	PI	0.99	0.97	1.11
10/9	TC	3.97	3.81	3.65
	PI	1.04	1.11	1.17
15/12	TC	4.17	4.01	3.85
	PI	1.10	1.17	1.23
(Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

- TC – Total Heating Capacity, kW
 PI – Power Input, kW
 WB – Wet Bulb Temp., (°C)
 DB – Dry Bulb Temp., (°C)
 ID – Indoor
 OU – Outdoor

5.5.4 Capacity Correction Factors

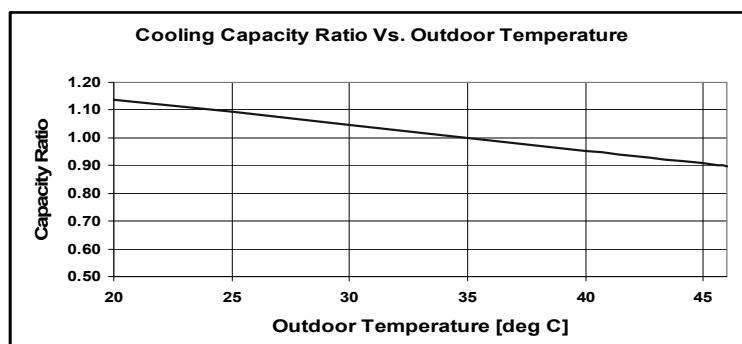
5.5.5 Capacity Correction Factor Due to Tubing Length**5.5.5.1 Cooling****5.5.5.2 Heating**

5.6 HAD018 / GC 18**5.6.1 Cooling Capacity (kW) – Run Mode****230[V] : Indoor Fan at High Speed.**

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	4.93	5.22	5.51	5.80	6.09
	SC	4.10	4.16	4.22	4.28	4.34
	PI	1.10	1.13	1.15	1.18	1.20
30	TC	4.67	4.96	5.25	5.54	5.83
	SC	3.94	4.00	4.06	4.12	4.18
	PI	1.26	1.28	1.31	1.33	1.36
35	TC	4.42	4.71	5.00	5.29	5.58
	SC	3.78	3.84	3.90	3.96	4.02
	PI	1.41	1.44	1.46	1.48	1.51
40	TC	4.17	4.46	4.75	5.04	5.33
	SC	3.62	3.68	3.74	3.80	3.86
	PI	1.56	1.59	1.61	1.64	1.66
46	TC	3.86	4.15	4.44	4.73	5.02
	SC	3.43	3.49	3.55	3.61	3.67
	PI	1.75	1.77	1.80	1.82	1.85

LEGEND

- TC – Total Cooling Capacity, kW
 SC – Sensible Capacity, kW
 PI – Power Input, kW
 WB – Wet Bulb Temp., (°C)
 DB – Dry Bulb Temp., (°C)
 ID – Indoor
 OD – Outdoor

5.6.2 Capacity Correction Factors

5.6.3 Heating Capacity (kW) - Run Mode

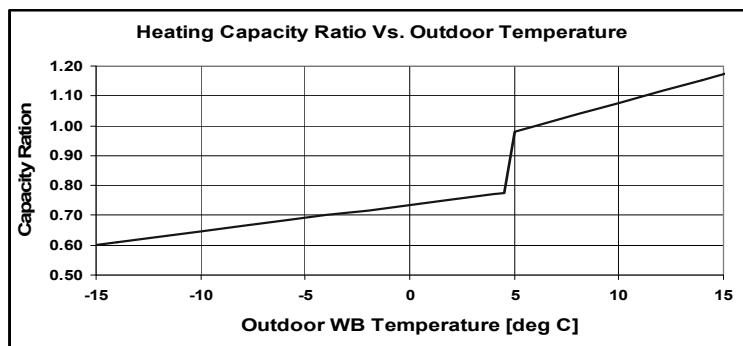
230[V] : Indoor Fan at High Speed.

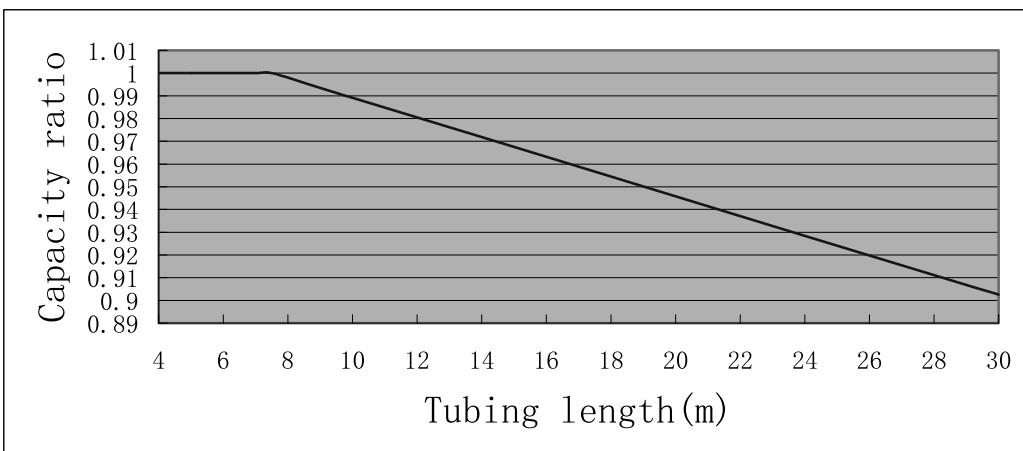
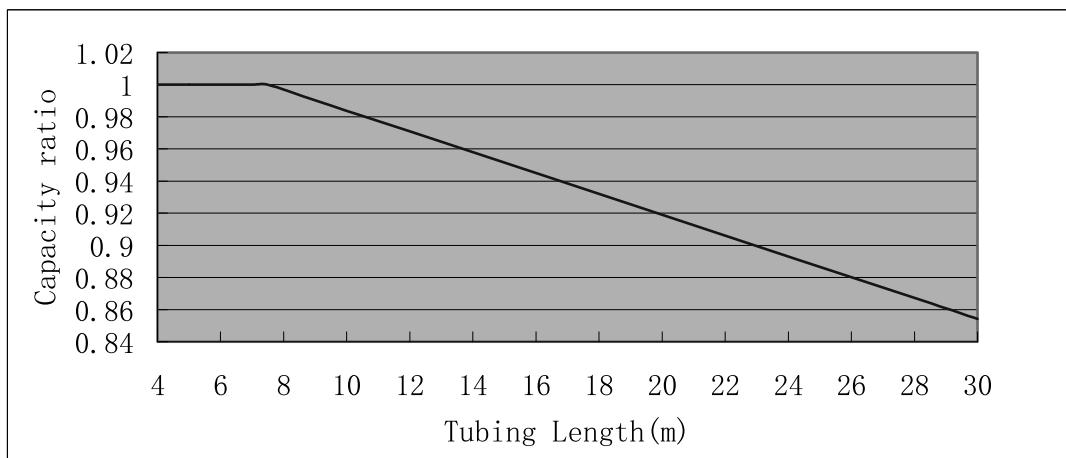
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	2.73	2.34	1.94
	PI	1.16	1.24	1.33
-10/-12	TC	3.60	3.21	2.82
	PI	1.31	1.40	1.48
-7/-8	TC	4.26	3.87	3.47
	PI	1.43	1.51	1.59
-1/-2	TC	4.59	4.19	3.80
	PI	1.48	1.57	1.65
2/1	TC	4.81	4.41	4.02
	PI	1.52	1.60	1.69
7/6	TC	6.39	6.00	5.61
	PI	1.58	1.66	1.74
10/9	TC	6.72	6.33	5.94
	PI	1.61	1.69	1.77
15/12	TC	7.06	6.66	6.27
	PI	1.64	1.72	1.80
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

LEGEND

- TC – Total Heating Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OU – Outdoor

5.6.4 Capacity Correction Factors



5.6.5 Capacity Correction Factor Due to Tubing Length**5.6.5.1 Cooling****5.6.5.2 Heating**

5.7 HAD022 / GC 21

5.7.1 Cooling Capacity (kW) – Run Mode

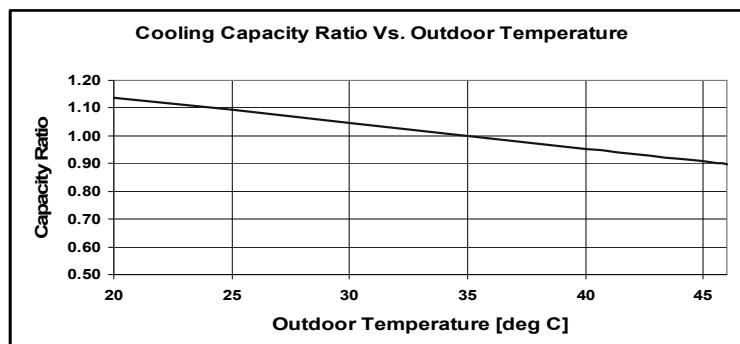
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	5.91	6.26	6.61	6.95	7.30
	SC	4.64	4.71	4.78	4.85	4.92
	PI	1.50	1.54	1.57	1.61	1.64
30	TC	5.61	5.96	6.30	6.65	7.00
	SC	4.46	4.53	4.60	4.67	4.74
	PI	1.71	1.75	1.78	1.81	1.85
35	TC	5.30	5.65	6.00	6.35	6.70
	SC	4.28	4.35	4.42	4.49	4.56
	PI	1.92	1.96	1.99	2.02	2.06
40	TC	5.00	5.35	5.70	6.05	6.39
	SC	4.10	4.17	4.24	4.31	4.38
	PI	2.13	2.17	2.20	2.23	2.27
46	TC	4.64	4.99	5.33	5.68	6.03
	SC	3.88	3.95	4.02	4.09	4.16
	PI	2.38	2.42	2.45	2.48	2.52

LEGEND

- TC – Total Cooling Capacity, kW
- SC – Sensible Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OD – Outdoor

5.7.2 Capacity Correction Factors

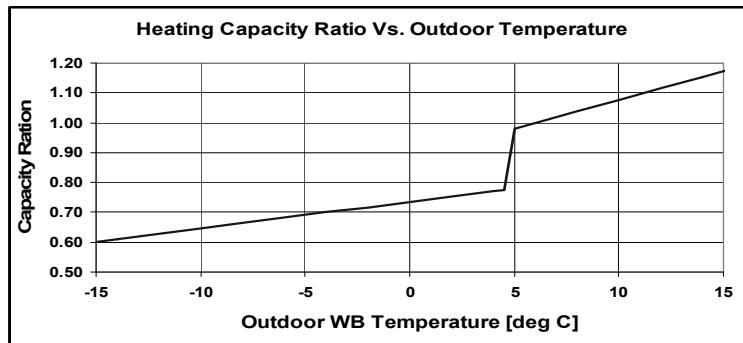


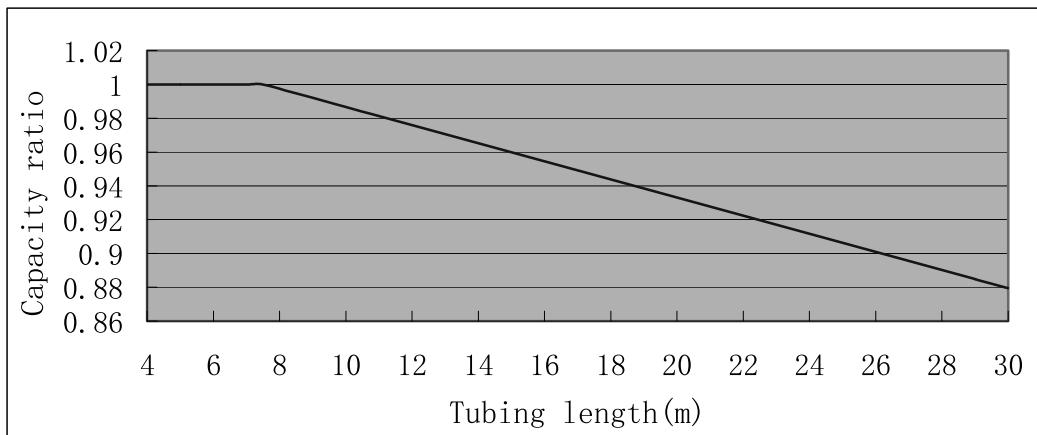
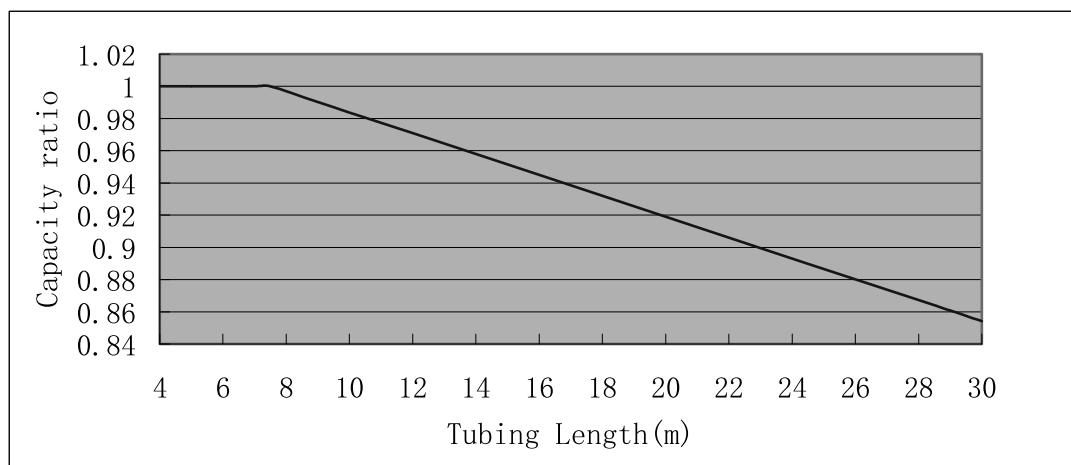
5.7.3 Heating Capacity (kW) - Run Mode**230[V] : Indoor Fan at High Speed.**

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	2.96	2.53	2.11
	PI	1.33	1.42	1.52
-10/-12	TC	3.90	3.48	3.05
	PI	1.50	1.60	1.69
-7/-8	TC	4.61	4.19	3.76
	PI	1.63	1.73	1.82
-1/-2	TC	4.97	4.54	4.12
	PI	1.70	1.79	1.89
2/1	TC	5.21	4.78	4.35
	PI	1.74	1.84	1.93
7/6	TC	6.93	6.50	6.07
	PI	1.81	1.90	2.00
10/9	TC	7.28	6.86	6.43
	PI	1.84	1.93	2.03
15/12	TC	7.64	7.22	6.79
	PI	1.87	1.97	2.06
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

LEGEND

- TC – Total Heating Capacity, kW
 PI – Power Input, kW
 WB – Wet Bulb Temp., (°C)
 DB – Dry Bulb Temp., (°C)
 ID – Indoor
 OU – Outdoor

5.7.4 Capacity Correction Factors

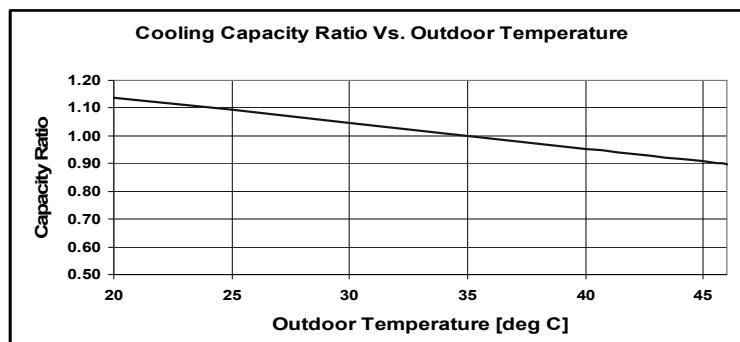
5.7.5 Capacity Correction Factor Due to Tubing Length**5.7.5.1 Cooling****5.7.5.2 Heating**

5.8 HAD024 / GC 24**5.8.1 Cooling Capacity (kW) – Run Mode****230[V] : Indoor Fan at High Speed.**

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	6.70	7.09	7.49	7.88	8.28
	SC	5.04	5.12	5.19	5.27	5.34
	PI	1.70	1.74	1.78	1.82	1.85
30	TC	6.35	6.75	7.14	7.54	7.93
	SC	4.85	4.92	5.00	5.07	5.15
	PI	1.94	1.98	2.01	2.05	2.09
35	TC	6.01	6.41	6.80	7.19	7.59
	SC	4.65	4.73	4.80	4.87	4.95
	PI	2.17	2.21	2.25	2.29	2.33
40	TC	5.67	6.06	6.46	6.85	7.25
	SC	4.45	4.53	4.60	4.68	4.75
	PI	2.41	2.45	2.49	2.52	2.56
46	TC	5.26	5.65	6.04	6.44	6.83
	SC	4.22	4.29	4.37	4.44	4.52
	PI	2.69	2.73	2.77	2.81	2.85

LEGEND

- TC – Total Cooling Capacity, kW
 SC – Sensible Capacity, kW
 PI – Power Input, kW
 WB – Wet Bulb Temp., (°C)
 DB – Dry Bulb Temp., (°C)
 ID – Indoor
 OD – Outdoor

5.8.2 Capacity Correction Factors

5.8.3 Heating Capacity (kW) - Run Mode

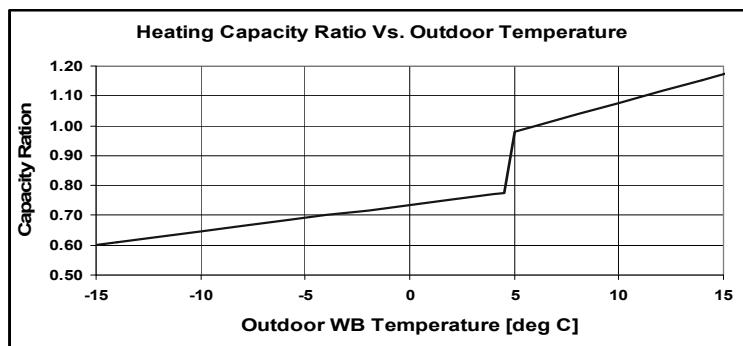
230[V] : Indoor Fan at High Speed.

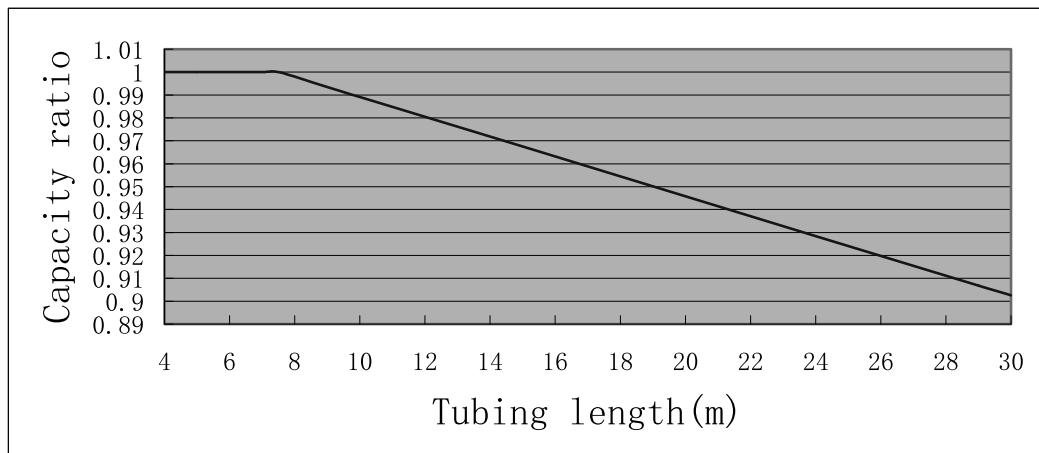
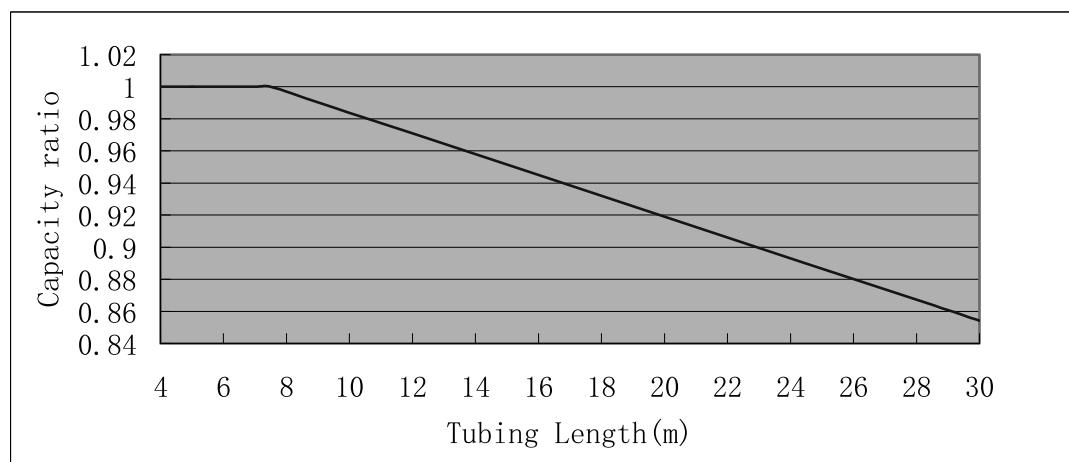
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	3.21	2.75	2.28
	PI	1.53	1.64	1.75
-10/-12	TC	4.23	3.77	3.31
	PI	1.73	1.84	1.95
-7/-8	TC	5.00	4.54	4.08
	PI	1.88	1.99	2.10
-1/-2	TC	5.39	4.93	4.47
	PI	1.96	2.07	2.17
2/1	TC	5.65	5.18	4.72
	PI	2.01	2.12	2.22
7/6	TC	7.51	7.05	6.59
	PI	2.08	2.15	2.30
10/9	TC	7.90	7.44	6.98
	PI	2.12	2.23	2.34
15/12	TC	8.29	7.83	7.37
	PI	2.16	2.27	2.38
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

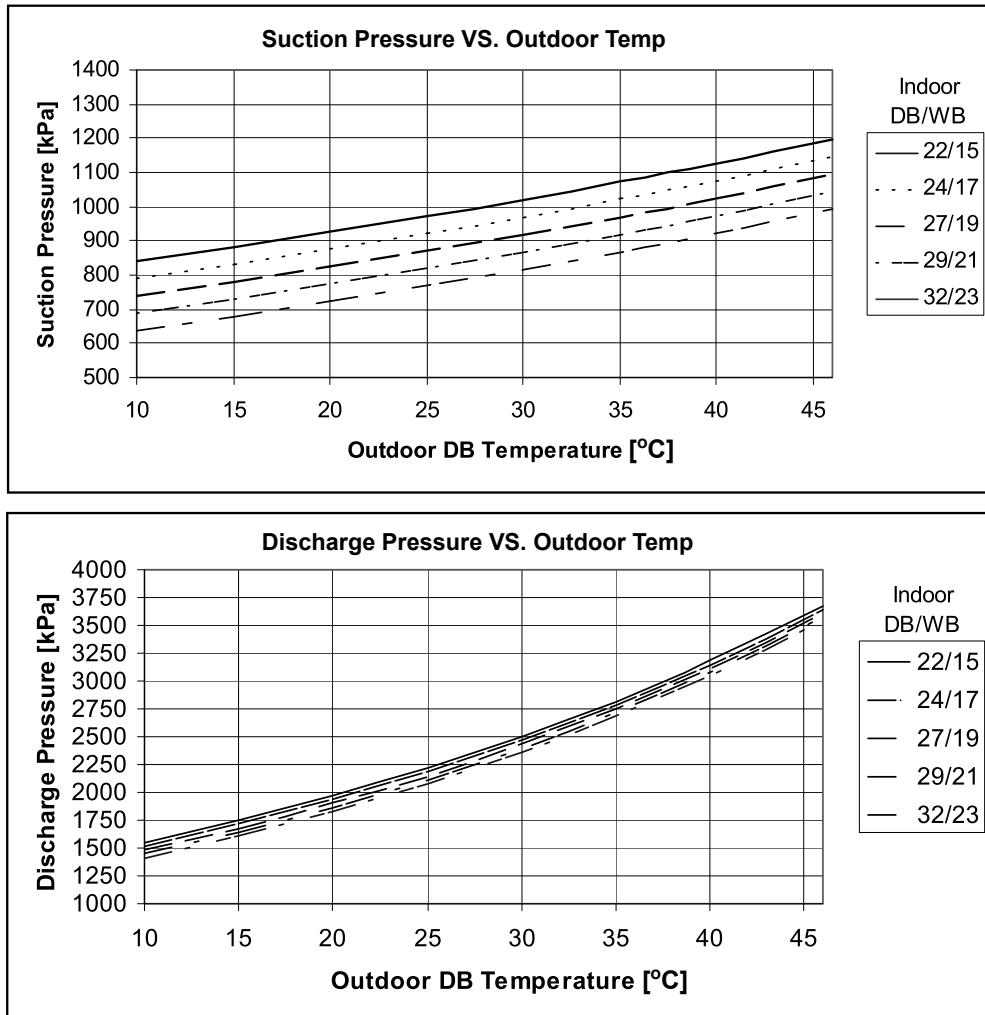
LEGEND

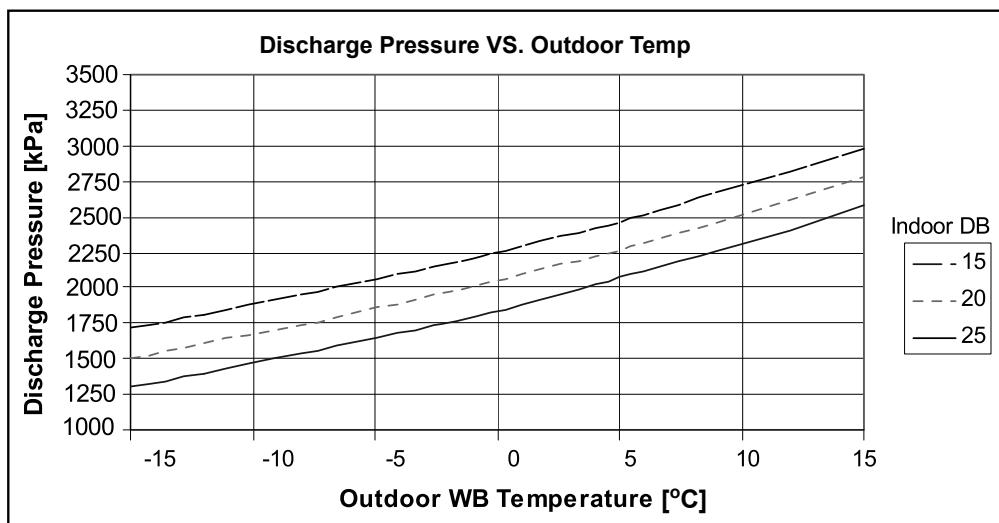
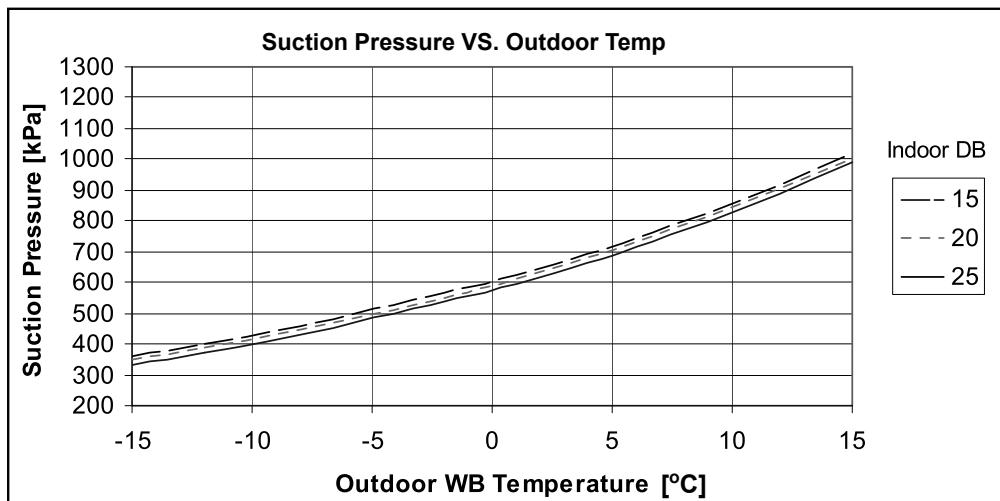
- TC – Total Heating Capacity, kW
- PI – Power Input, kW
- WB – Wet Bulb Temp., (°C)
- DB – Dry Bulb Temp., (°C)
- ID – Indoor
- OU – Outdoor

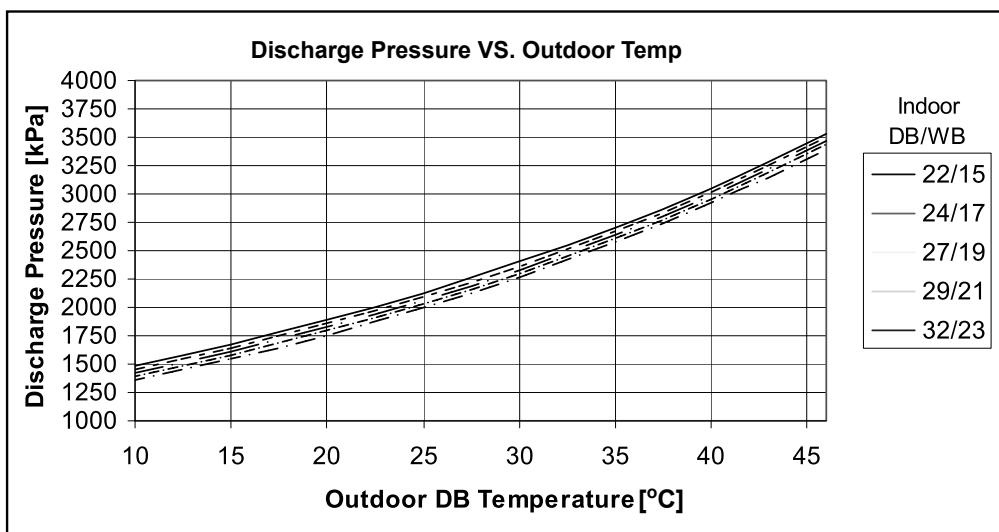
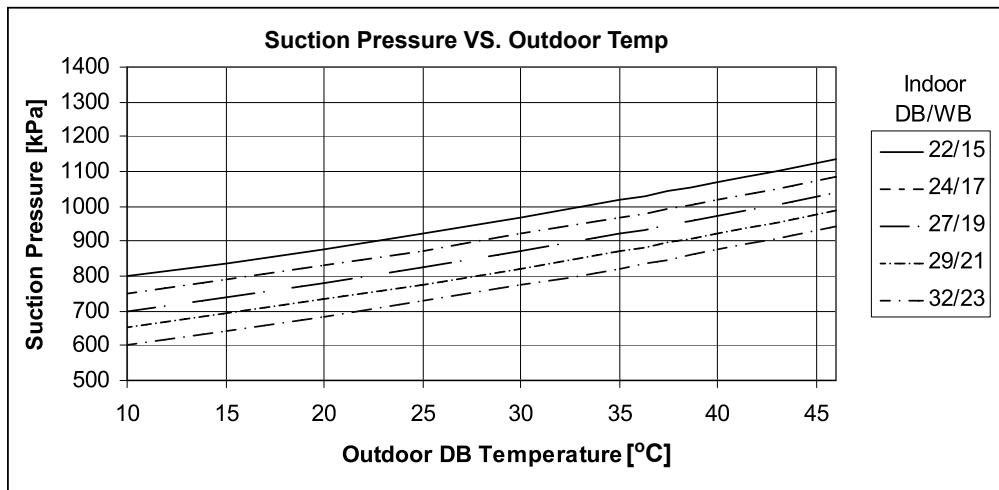
5.8.4 Capacity Correction Factors

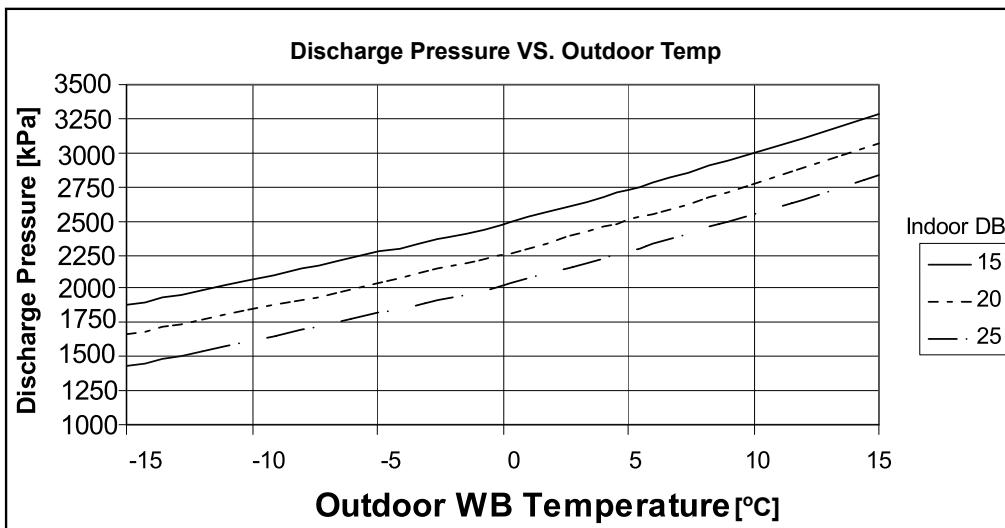
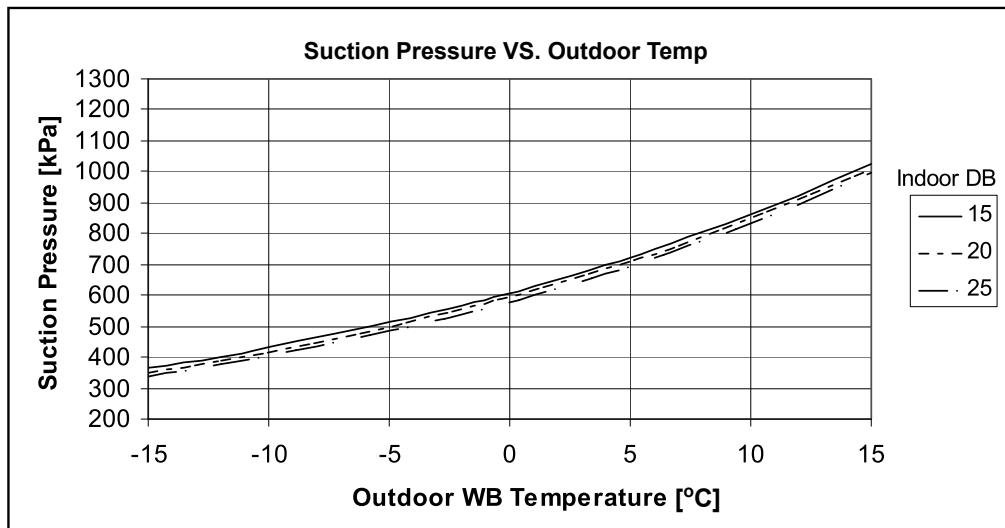


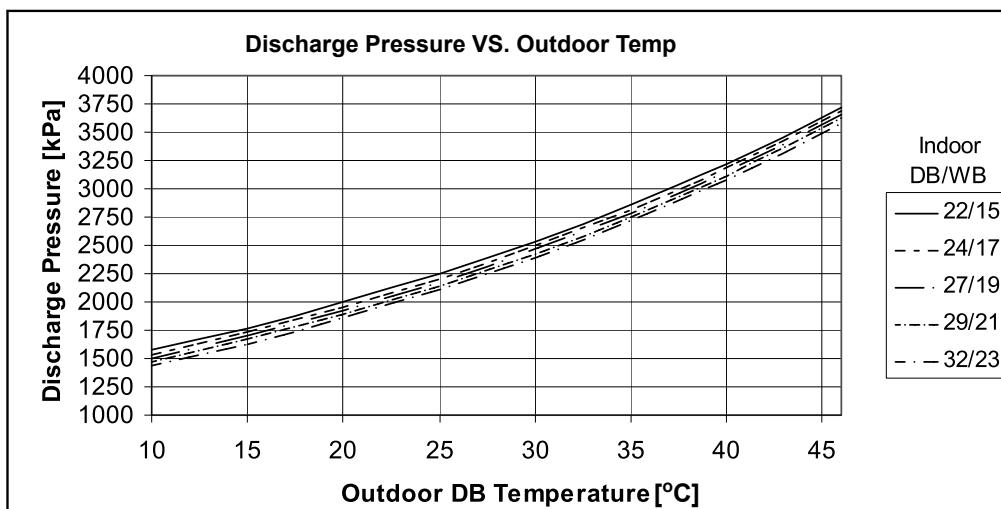
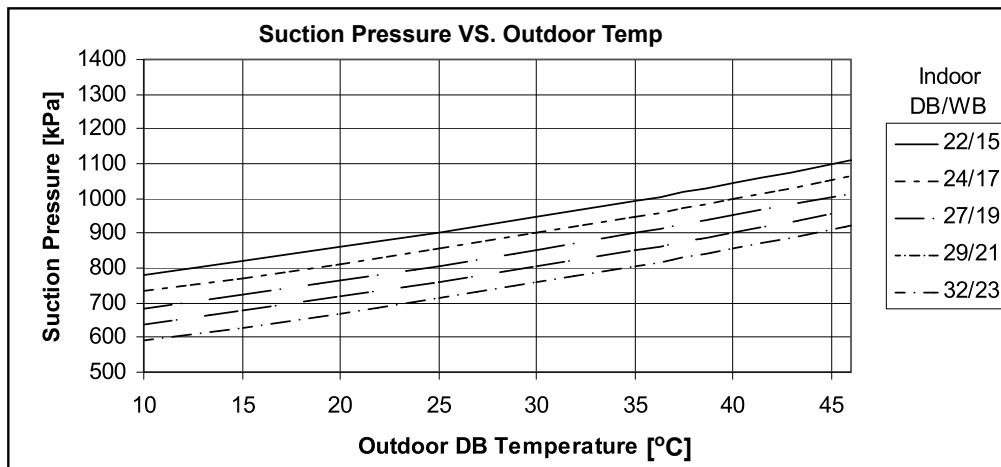
5.8.5 Capacity Correction Factor Due to Tubing Length**5.8.5.1 Cooling****5.8.5.2 Heating**

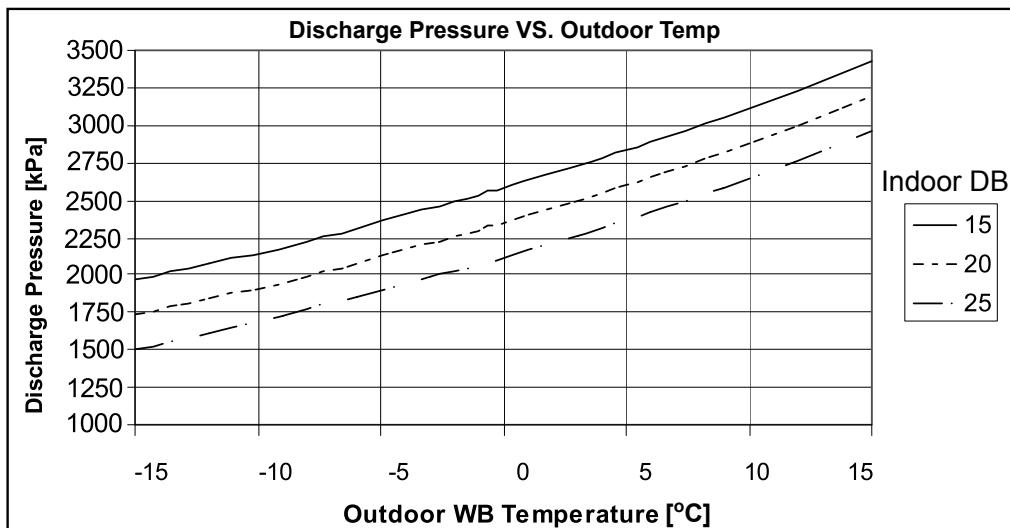
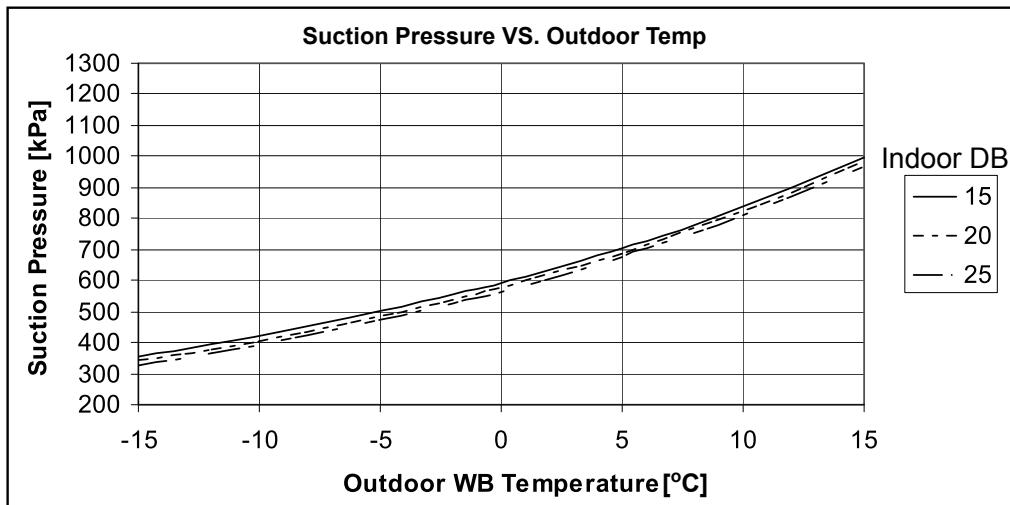
5.9 Model: HAD007 / GC 7 RC DCI**5.9.1 Cooling**

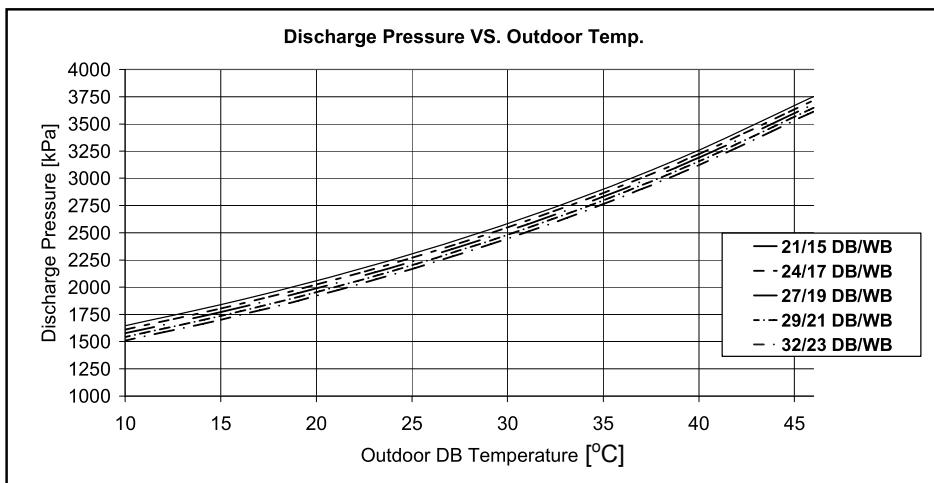
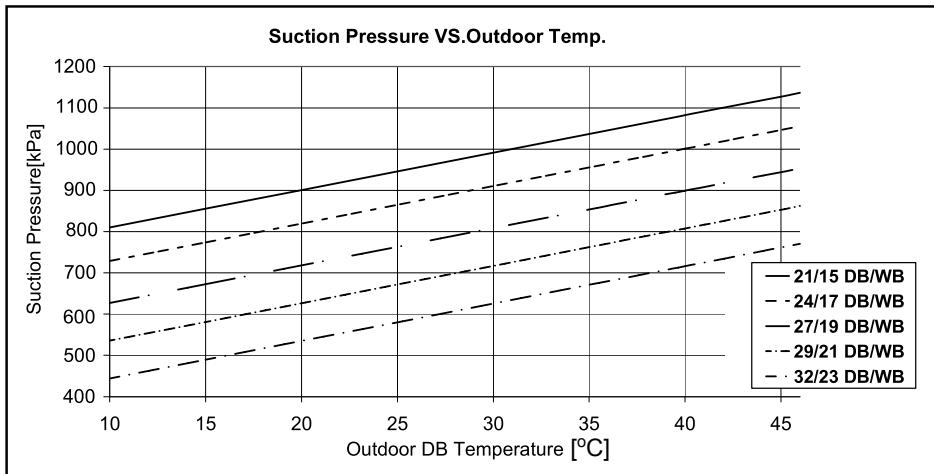
5.9.2 Heating

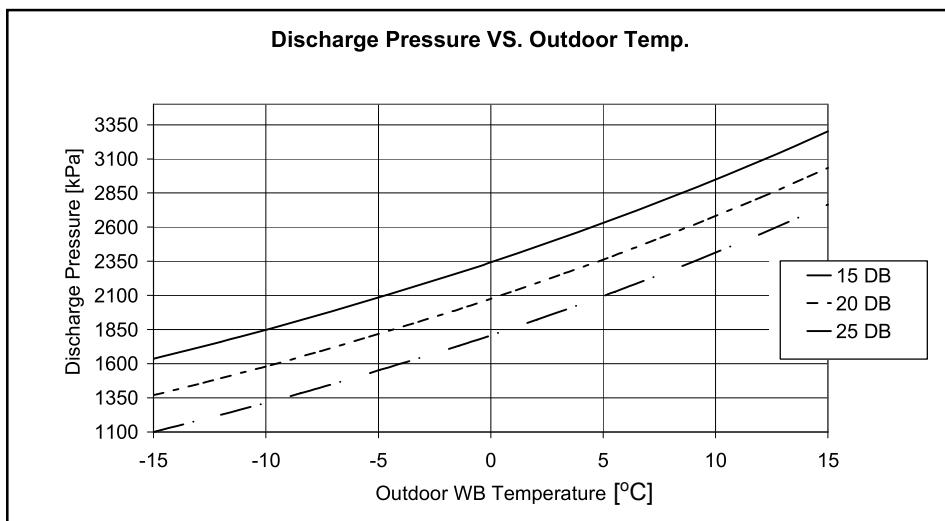
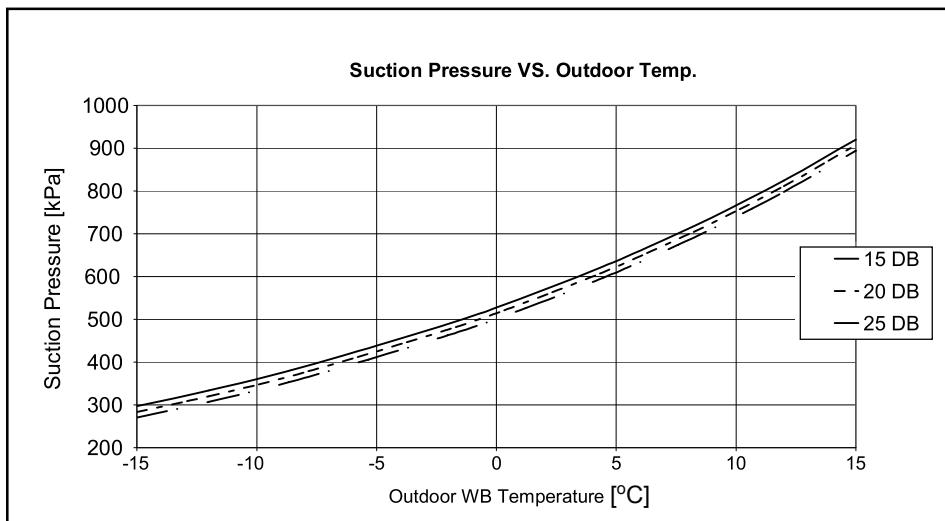
5.9.3 Model: HAD009 / GC 9 RC DCI**5.9.3.1 Cooling**

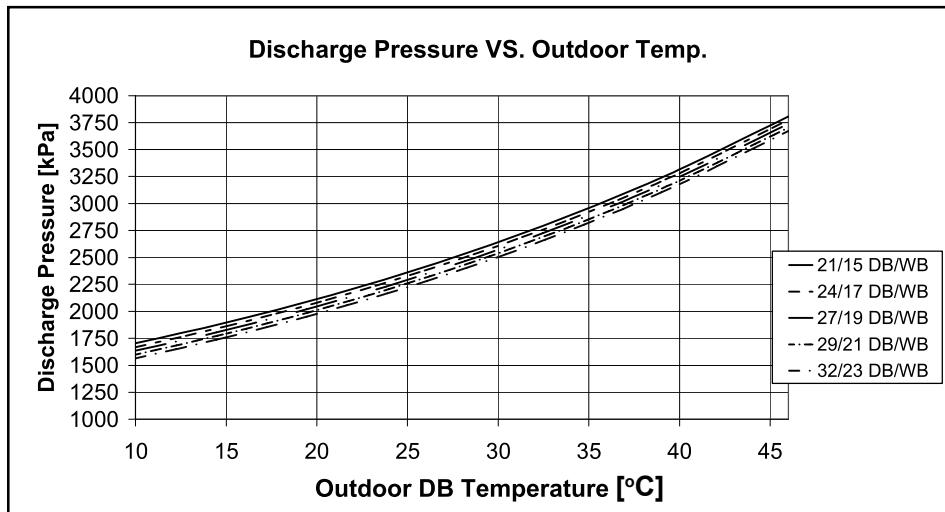
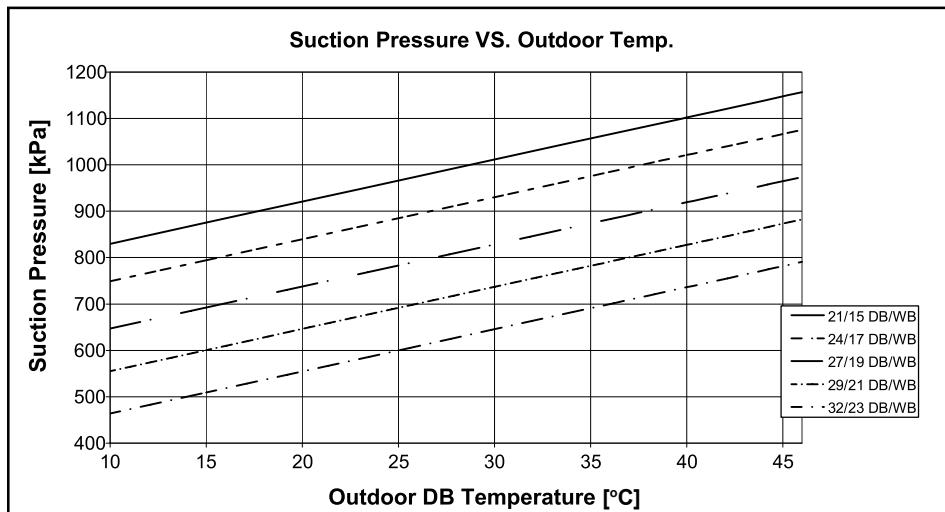
5.9.3.2 Heating

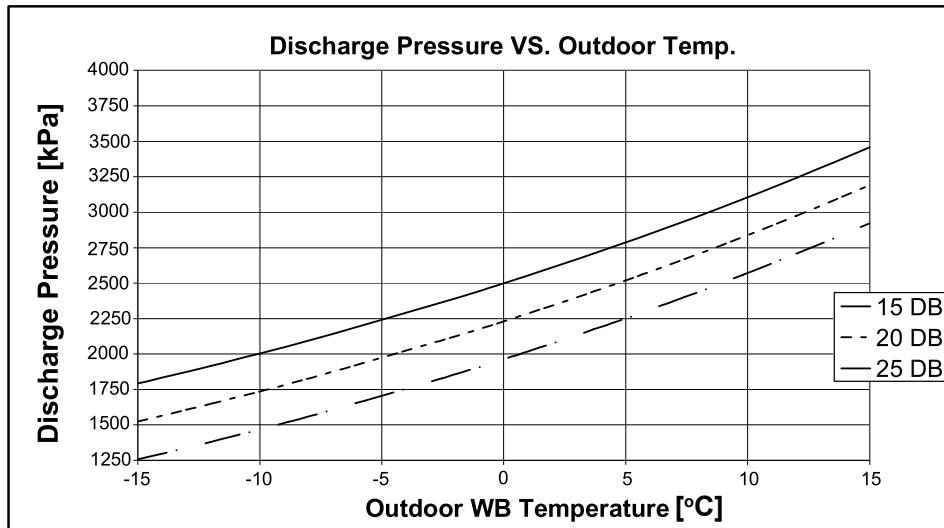
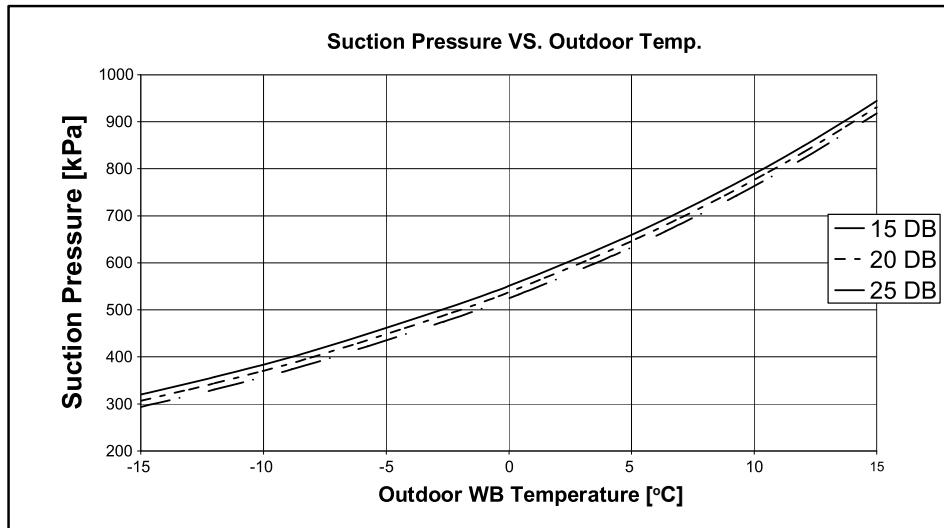
5.9.4 Model: HAD012 / GC 12 RC DCI**5.9.4.1 Cooling**

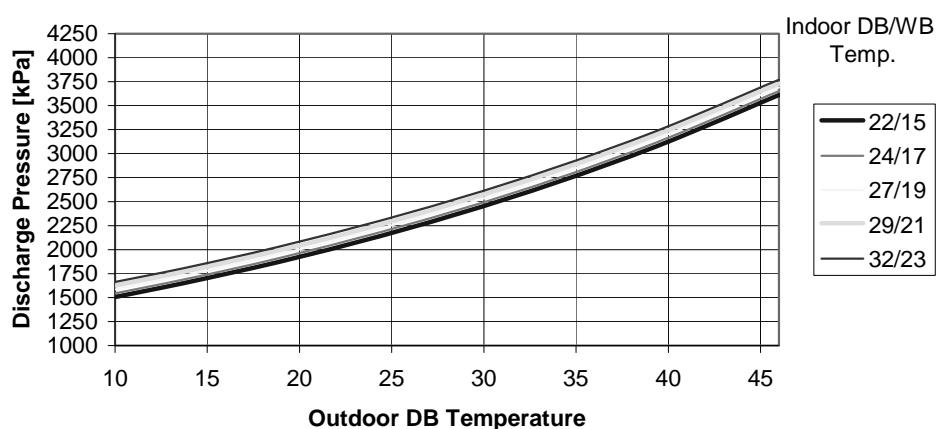
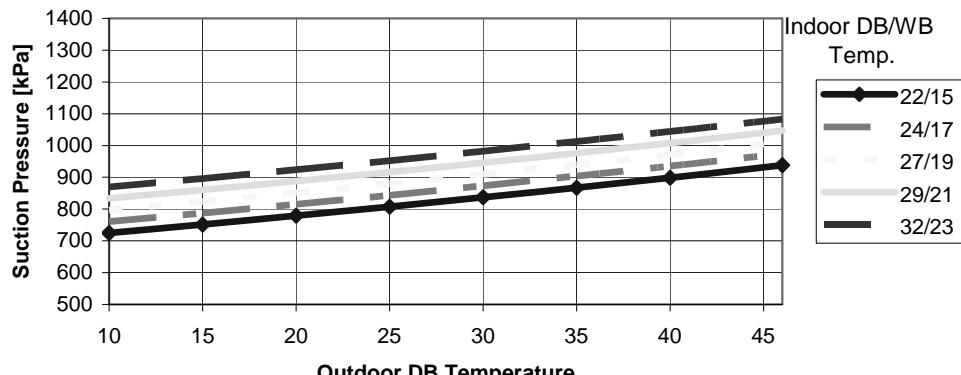
5.9.4.2 Heating

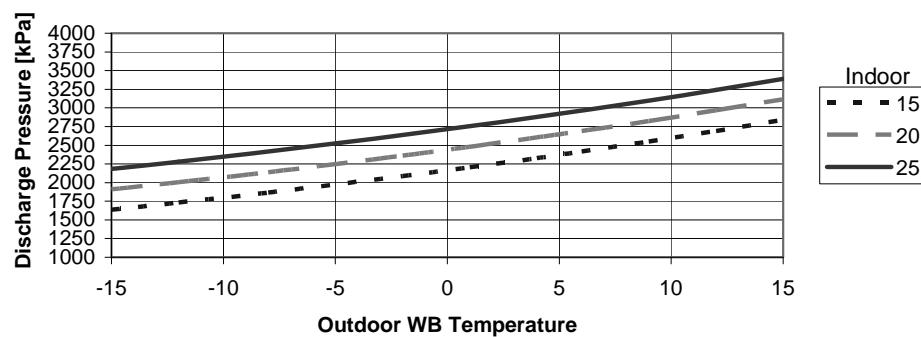
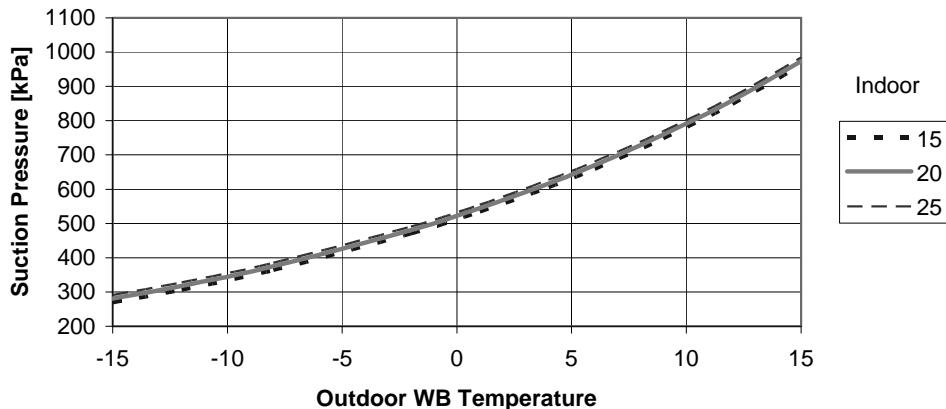
5.9.5 Model: HAD009 / GCD009**5.9.5.1 Cooling**

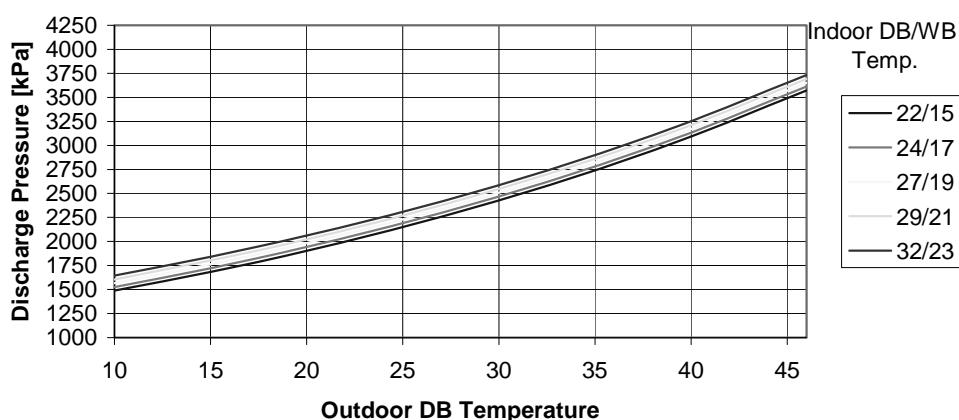
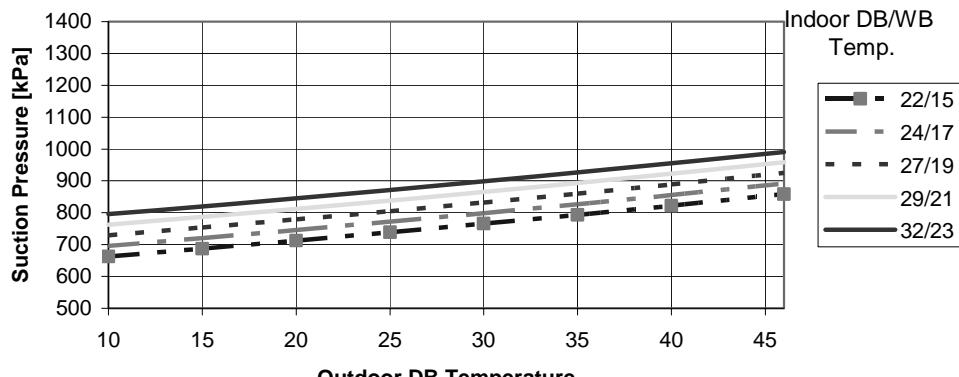
5.9.5.2 Heating

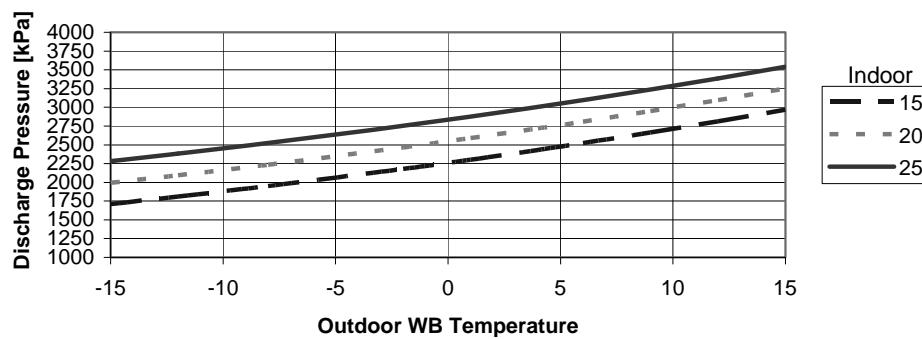
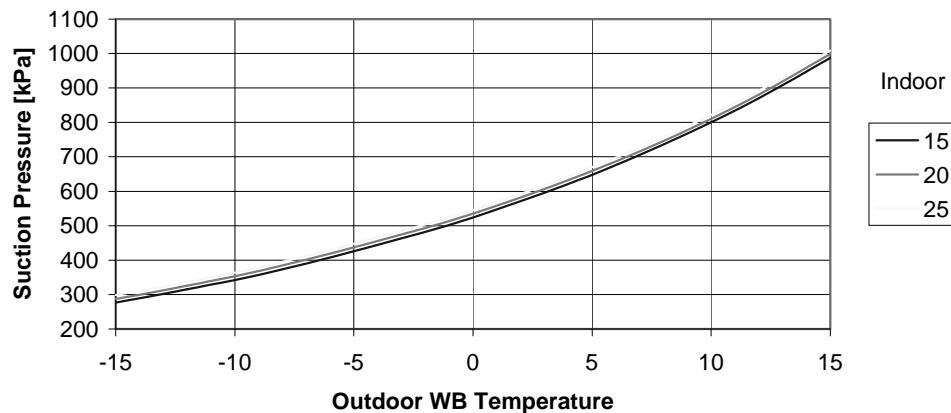
5.9.6 Model: HAD012 / GCD012**5.9.6.1 Cooling**

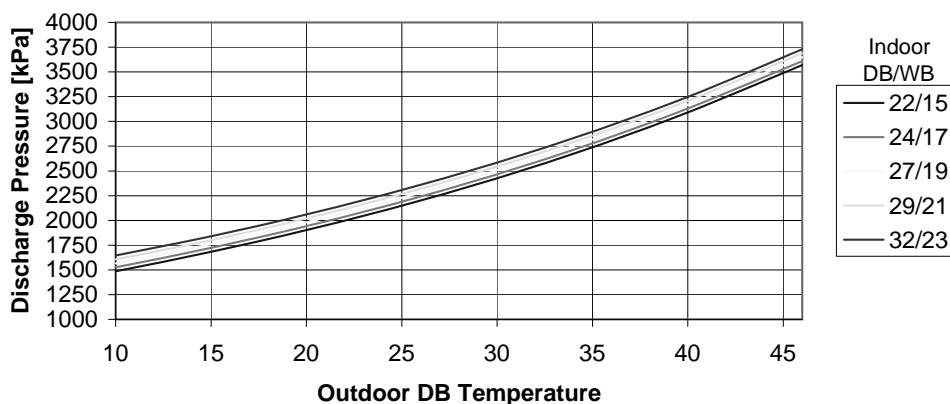
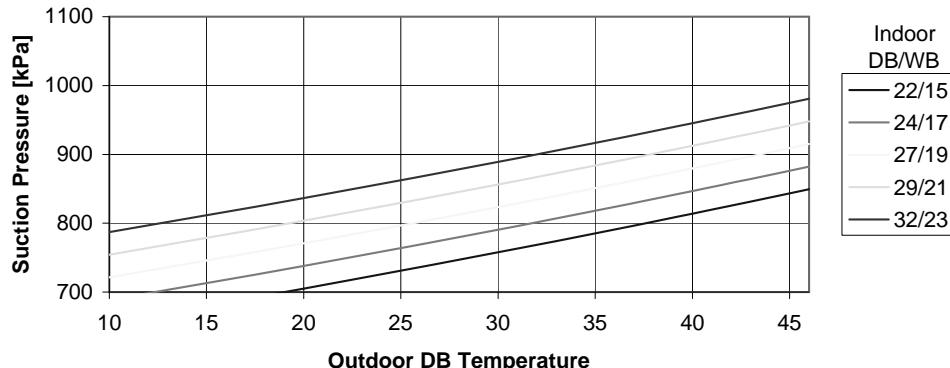
5.9.6.2 Heating

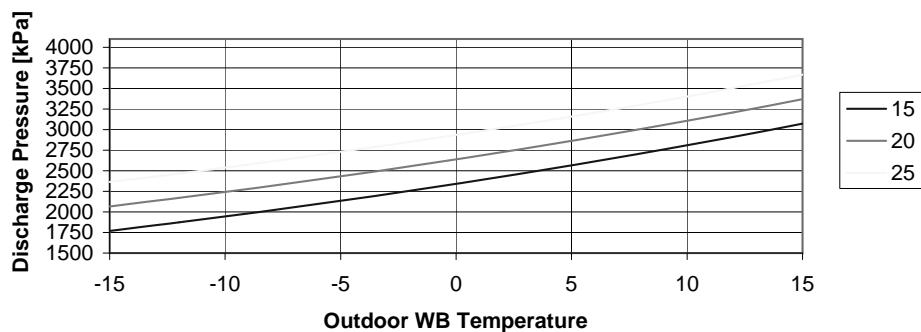
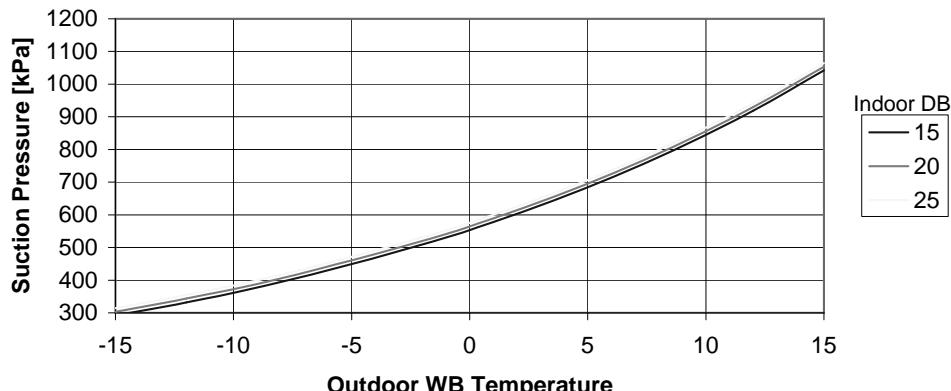
5.9.7 Model: HAD018 / GC 18**5.9.7.1 Cooling**

5.9.7.2 Heating

5.9.8 Model: HAD022 / GC 22**5.9.8.1 Cooling**

5.9.8.2 Heating

5.9.9 Model: HAD024 / GC 24**5.9..1 Cooling****6.3.1 Cooling-Test Mode**

5.9.9.2 Heating

6. SOUND LEVEL CHARACTERISTICS

6.1 Sound Pressure Level

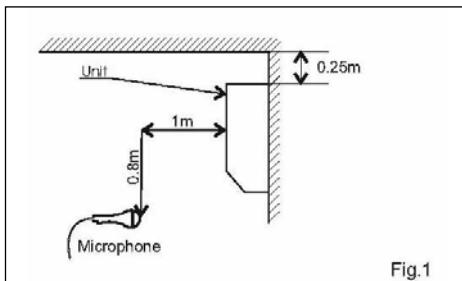
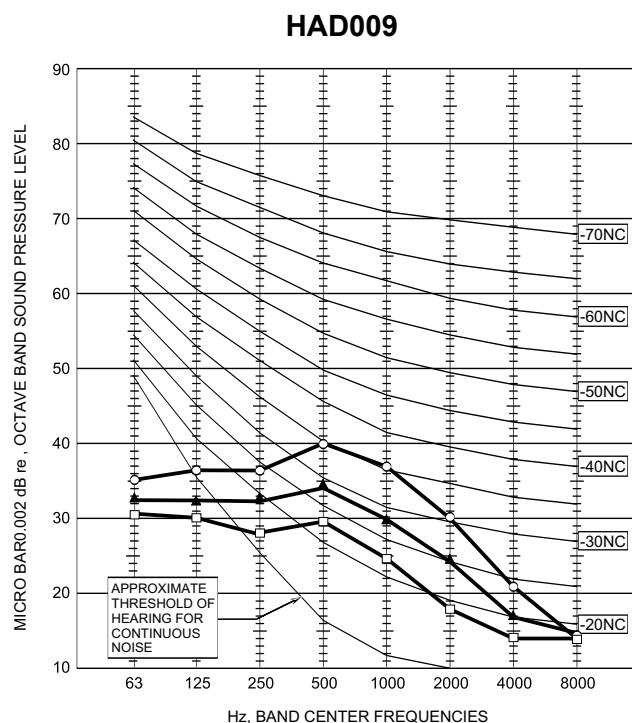
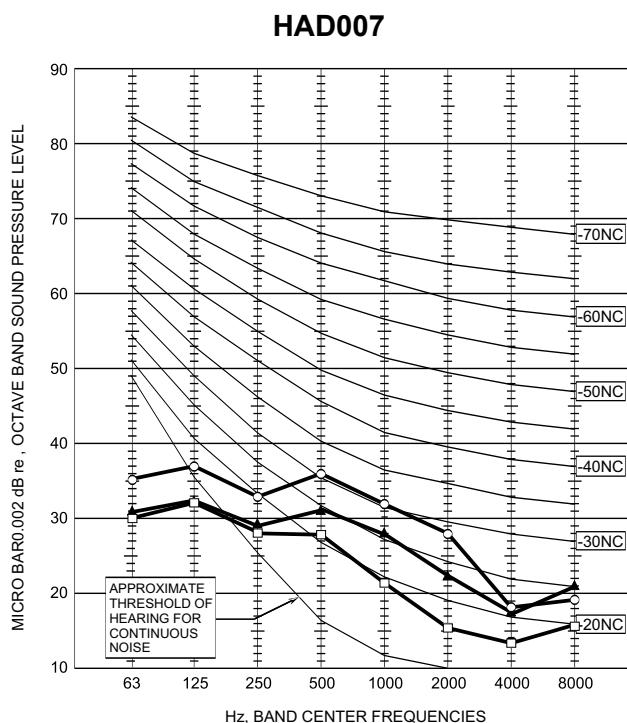
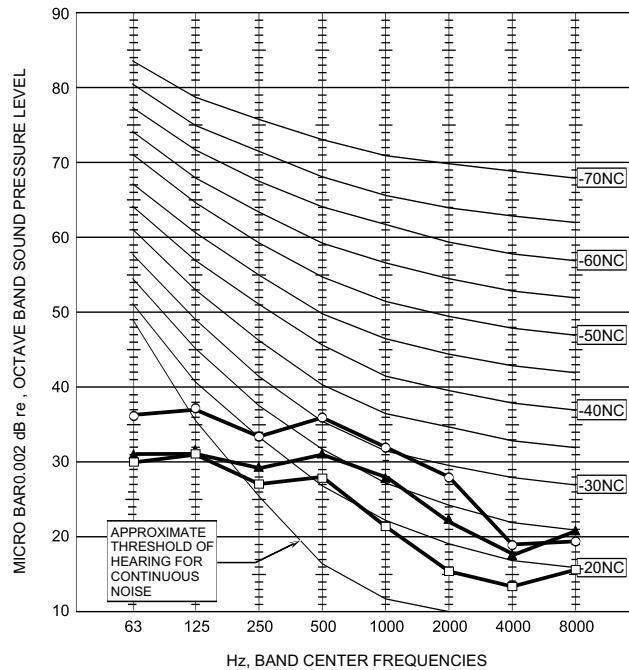
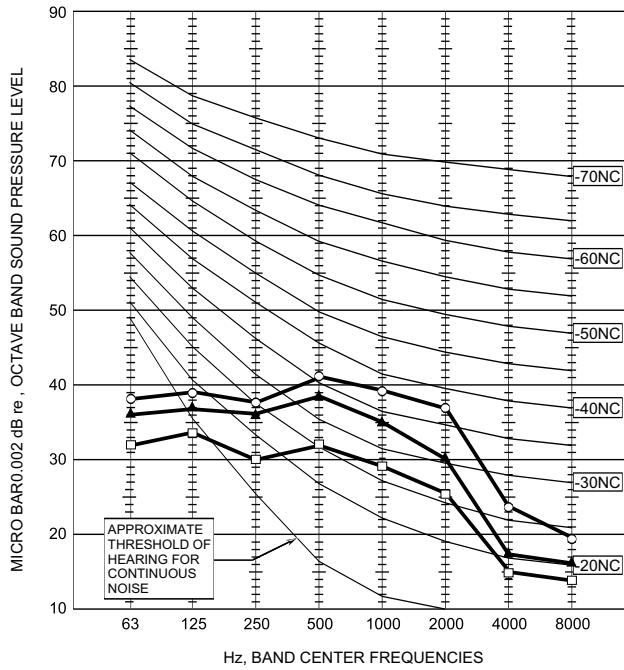
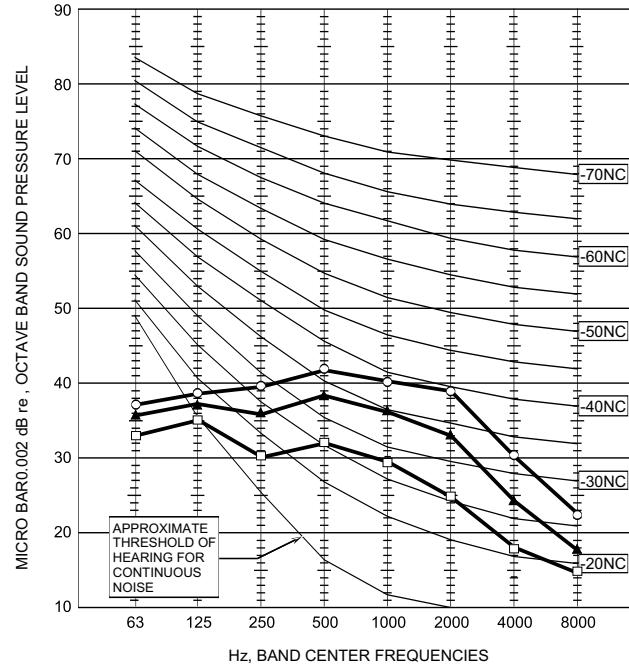
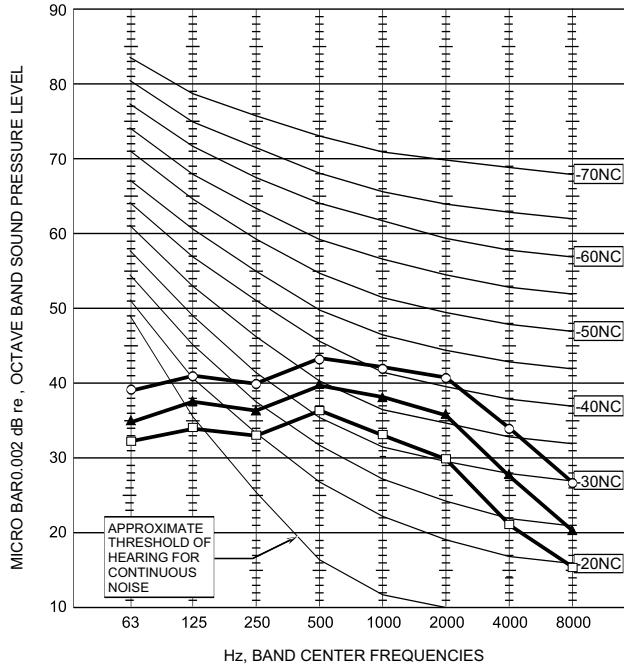


Figure 1. Wall Mounted

6.2 Sound Pressure Level Spectrum (Measured as Figure 1)



FAN SPEED	LINE
HI	—○—
ME	—▲—
LO	—□—

HAD0012**HAD0018****HAD022****HAD024**

6.3 Outdoor units

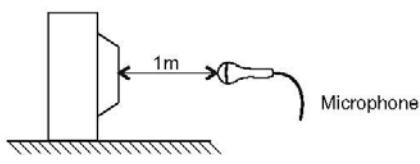
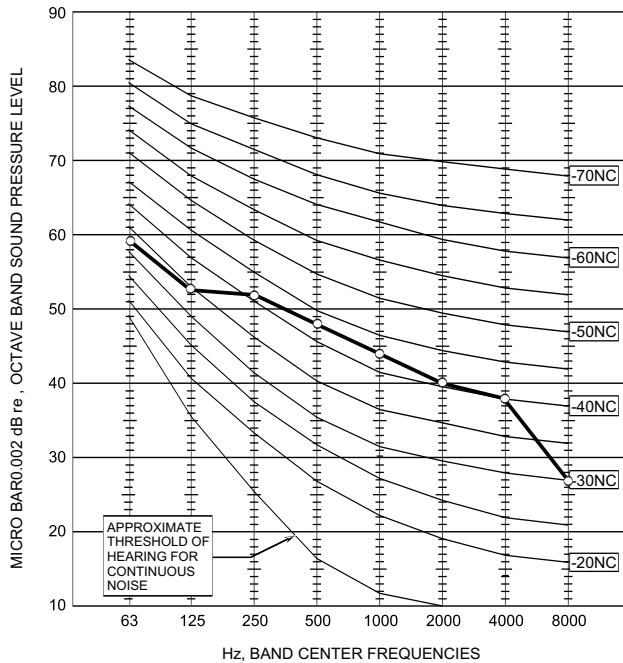


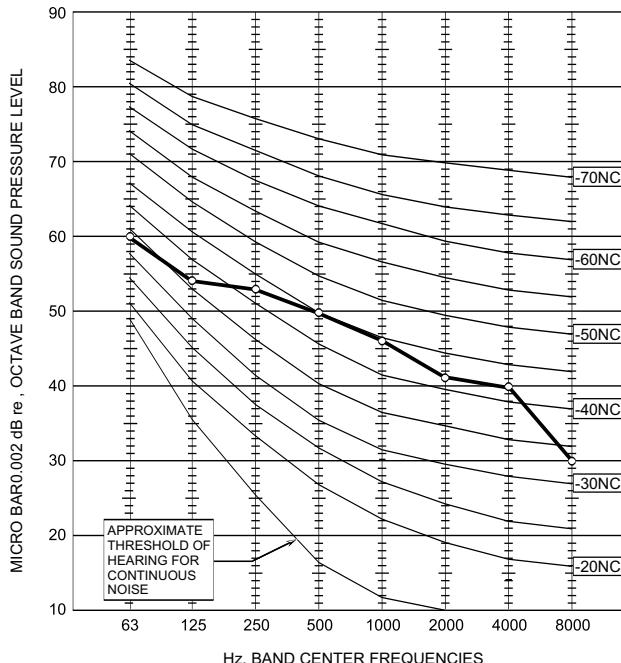
Fig.5
Microphone Distance from Unit

6.4 Sound Pressure Level Spectrum (Measured as Figure 5)

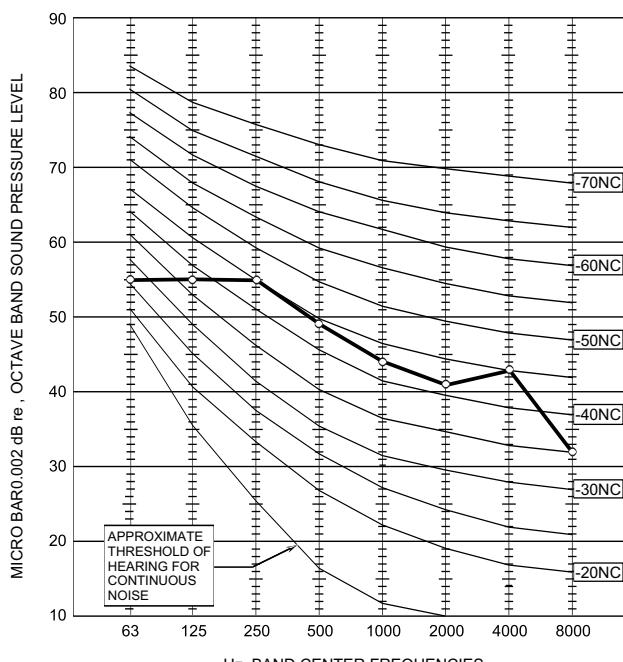
GC 7 RC DCI Cooling



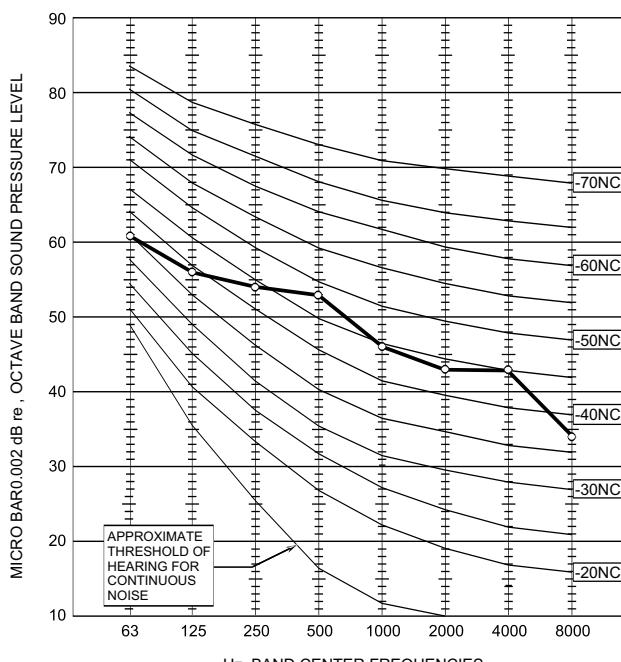
GC 7 RC DCI Heating

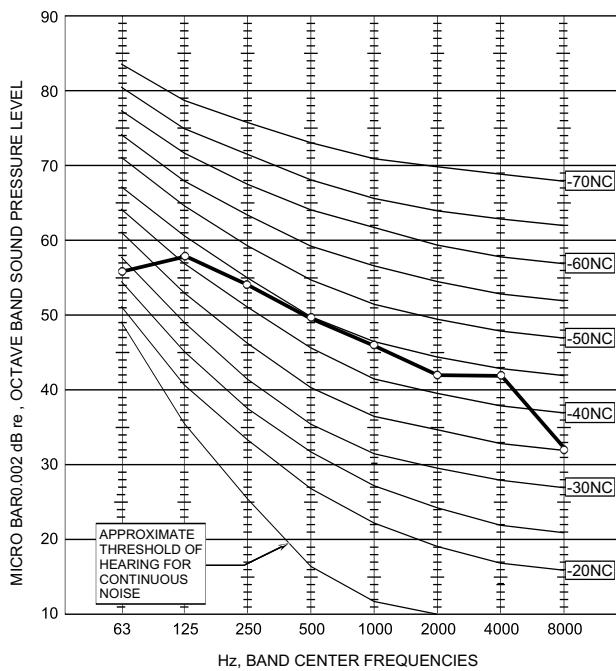
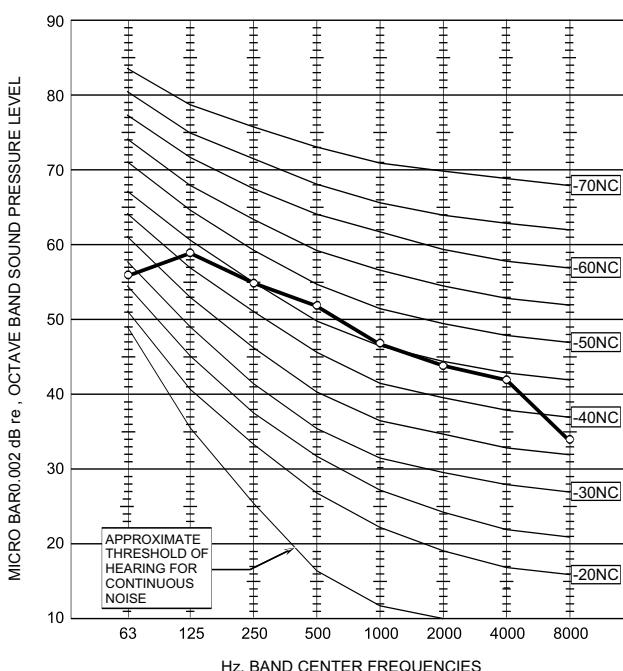
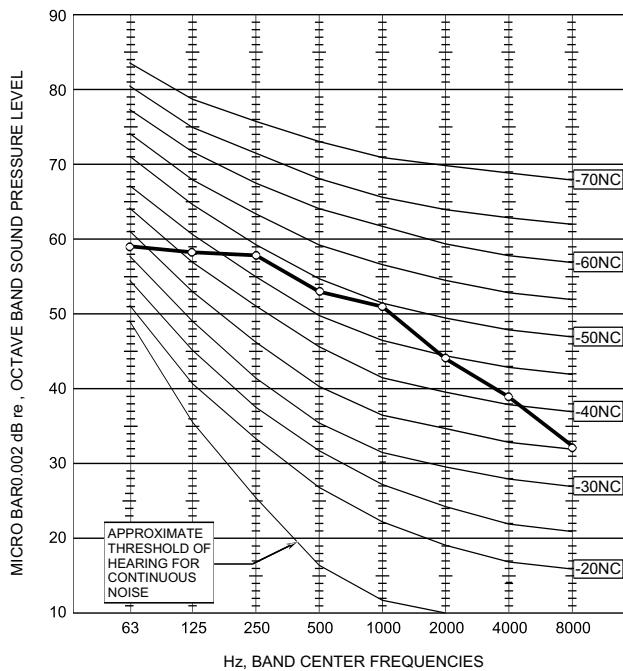
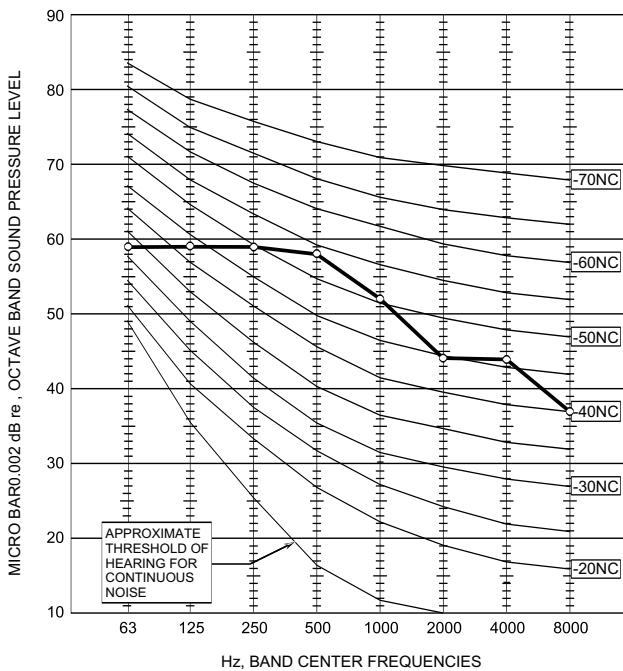


GC 9 RC DCI Cooling

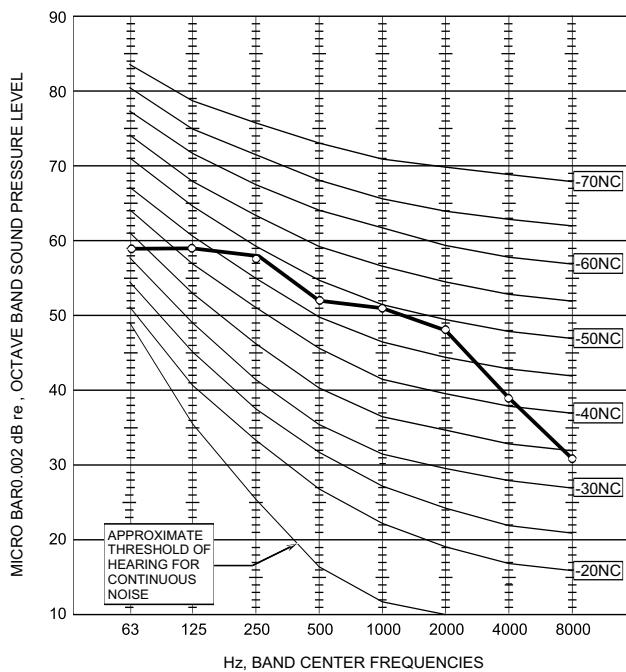


GC 9 RC DCI Heating

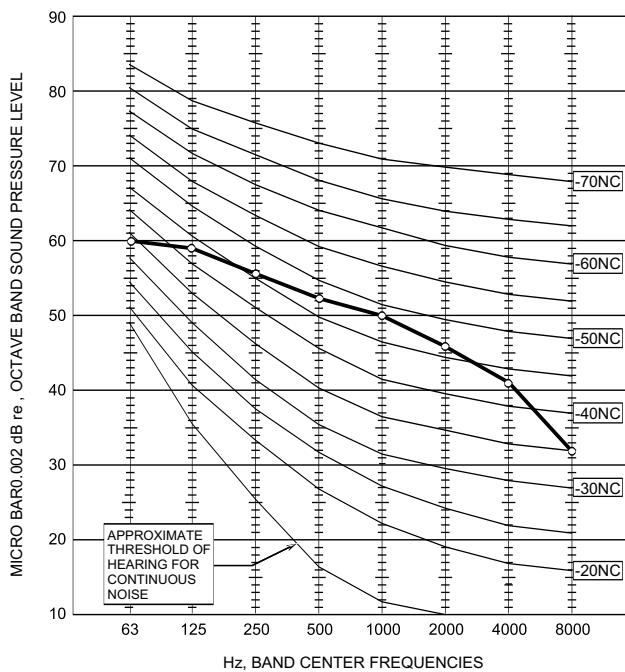


GC 12 RC DCI Cooling**GC 12 RC DCI Heating****GCD009 Cooling****GCD009 Heating**

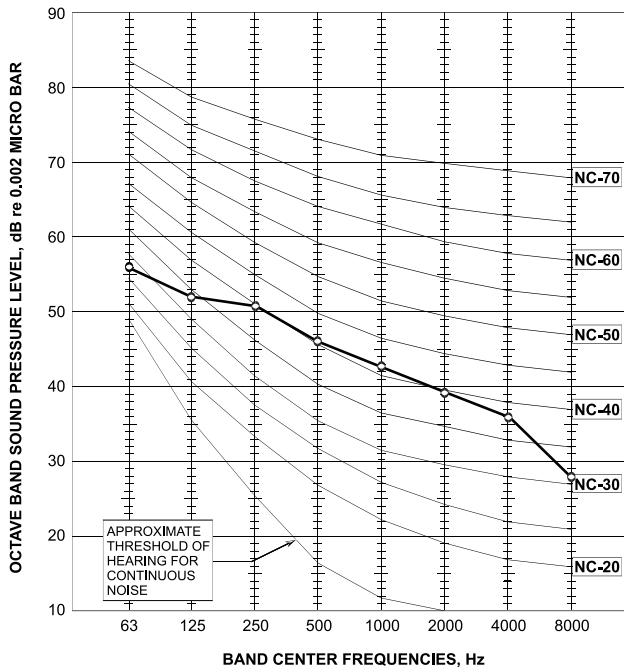
GCD012 Cooling



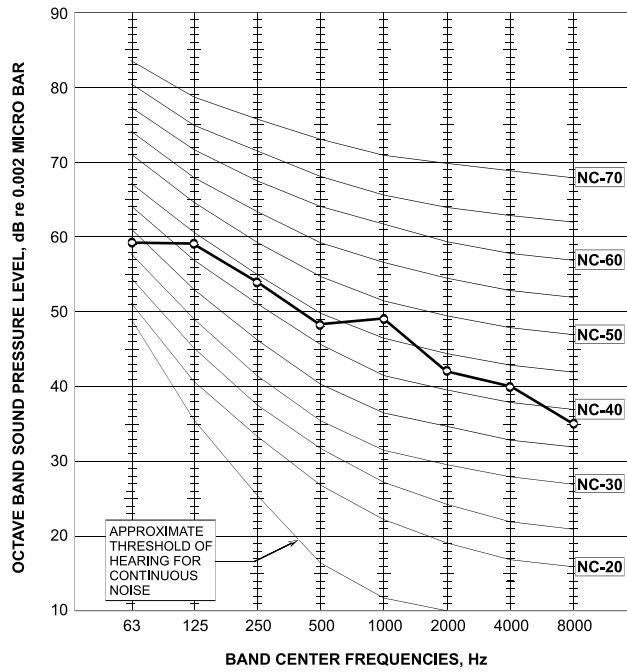
GCD012 Heating

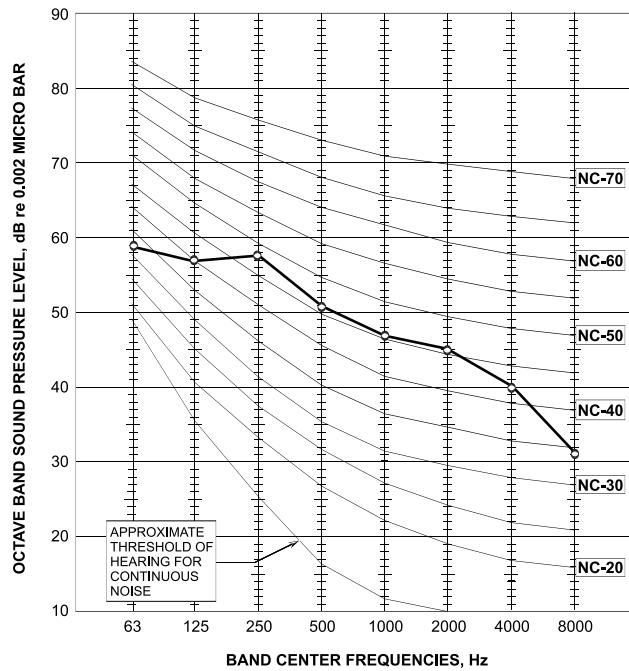
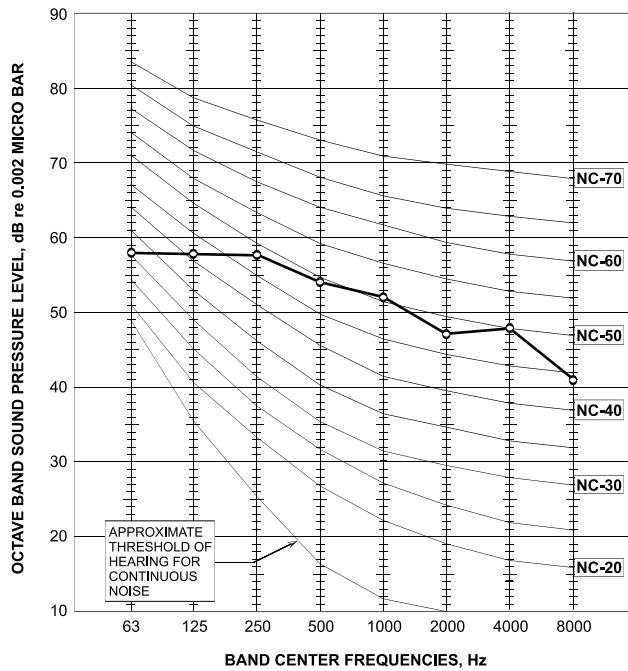
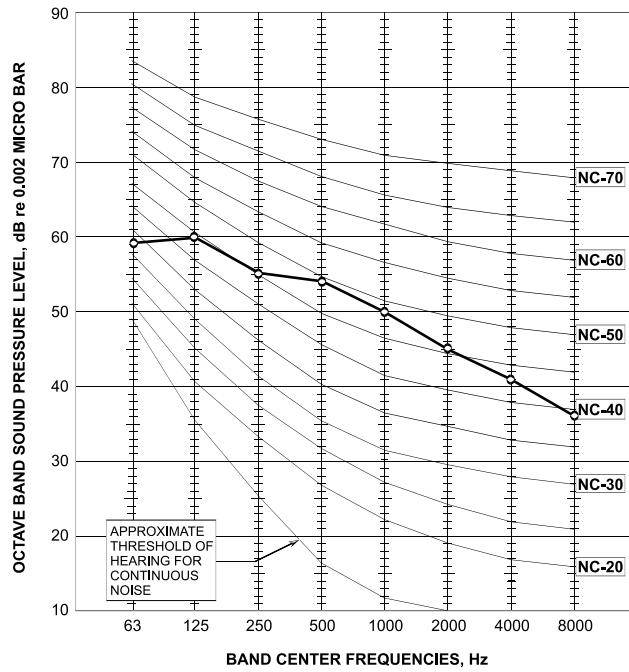
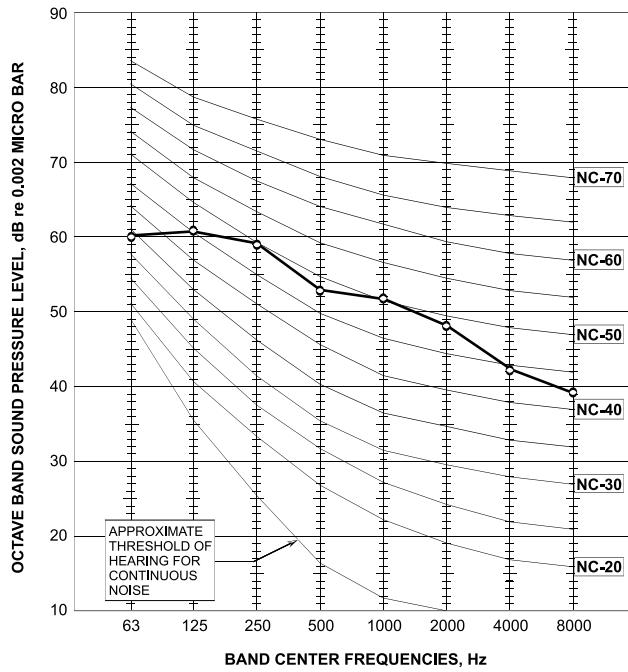


GC 18 Cooling



GC 18 Heating



GC 21 Cooling**GC 21 Heating****GC 24 Cooling****GC 24 Heating**

7. ELECTRICAL DATA

7.1 Single Phase Units

MODEL	HAD007	HAD009	HAD012
Power Supply	To indoor	To indoor	To indoor
	1PH,220-240V,50Hz	1PH,220-240V,50Hz	1PH,220-240V,50Hz
Max Current, A	5.2	6.3	7.5
Circuit Breaker,A	10	10	15
Power Supply Wiring No. X Cross Section mm ²	3x1.0 mm ²	3x1.0 mm ²	3x1.5 mm ²
Interconnecting Cable RC Model No. X Cross Section mm ²	4x1.0 mm ²	4x1.0 mm ²	5x1.5 mm ²

MODEL	HAD018/GC 18	HAD022/GC 21	HAD024/GC 24
Power Supply	1PH-230V-50Hz	1PH-230V-50Hz	1PH-230V-50Hz
Power Supply From	Indoor Unit	Indoor Unit	Outdoor Unit
Max Current(A)	10.5	10.5	15
Start Current(A)	10.5	10.5	15
Inrush Current(A)		45	
Circuit Breaker(A)	20	20	20
Power Supply Cord No.×Cross section mm ²	3×2.5mm ²	3×2.5mm ²	3×2.5mm ²
Interconnecting Cable No.×Cross section mm ²	4×2.5mm ²	4×2.5mm ²	4×2.5mm ²

Inrush current is the current when power is up (charging the DC capacitors at outdoor unit controller).

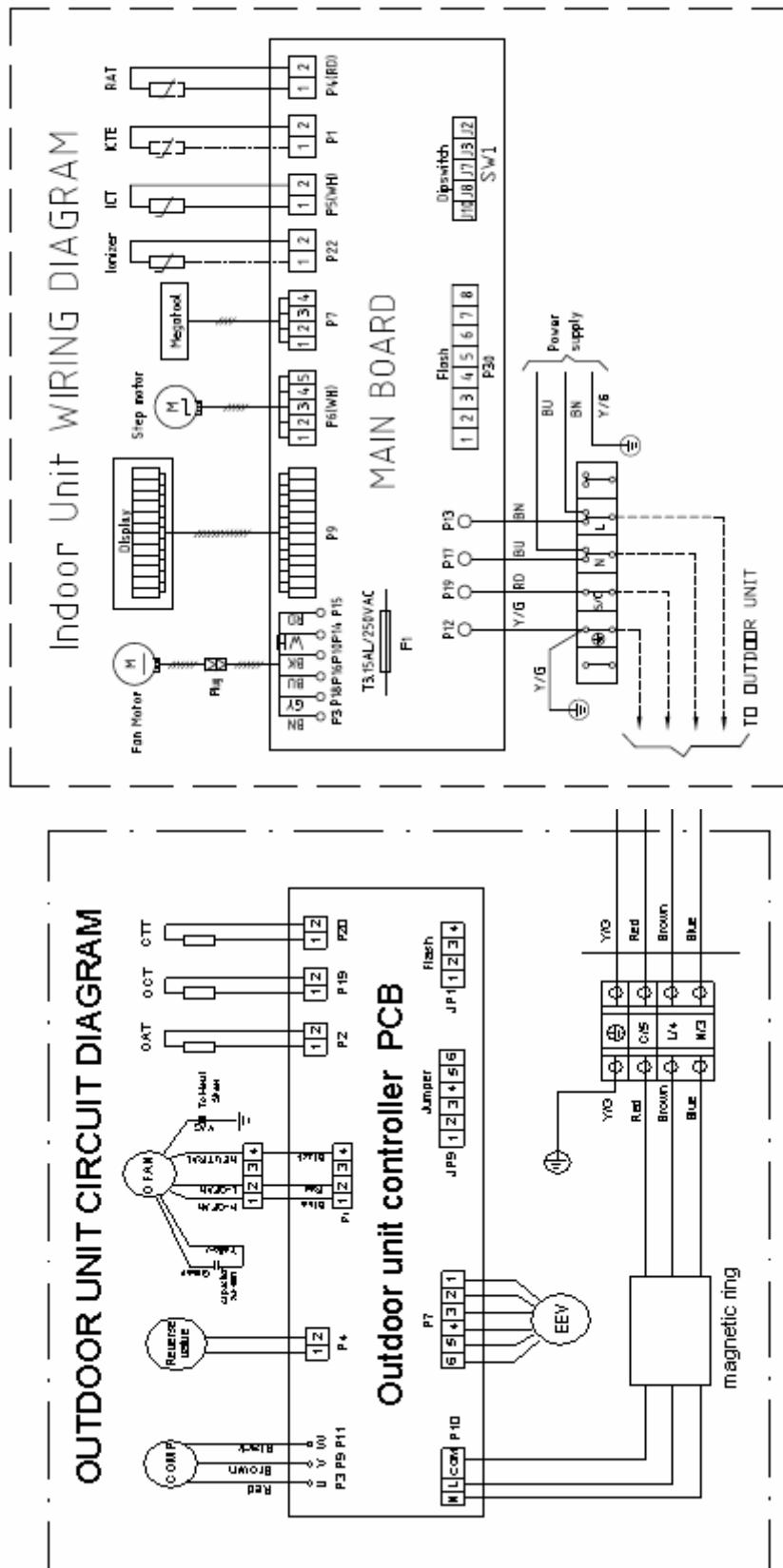
Starting current is the current when starting the compressor.

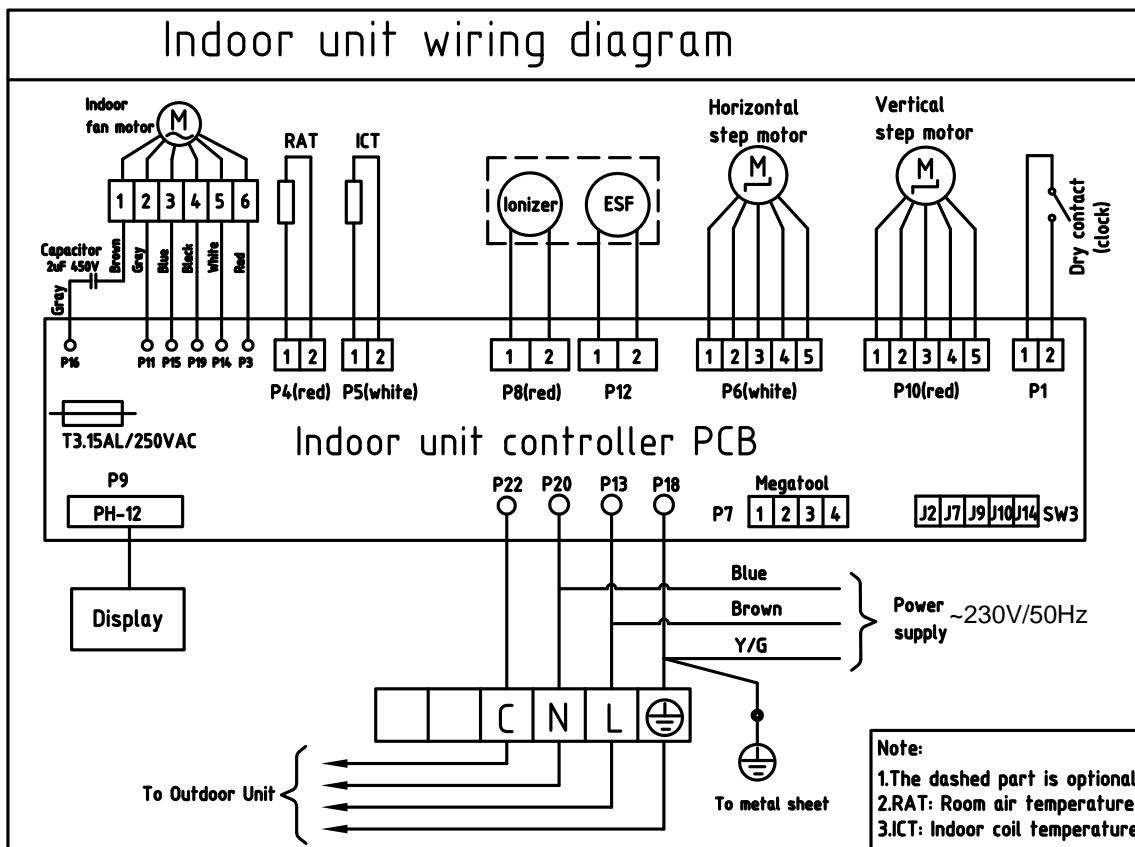
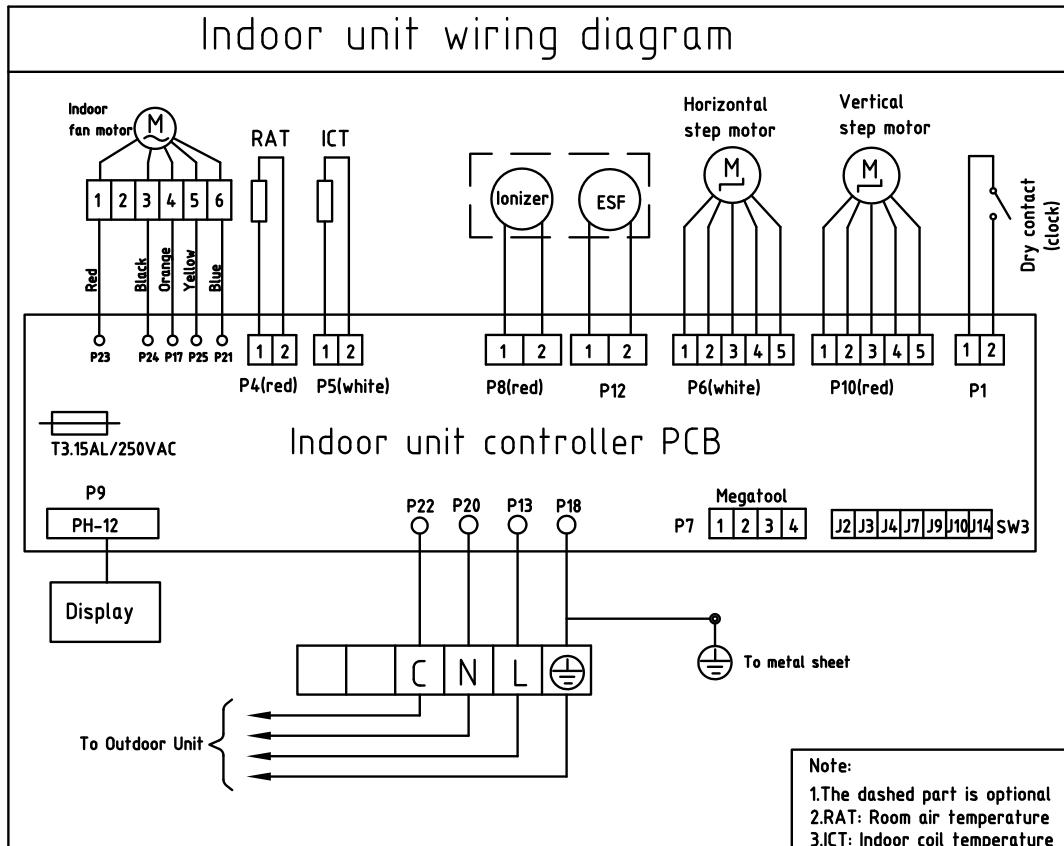
NOTE

Power wiring cord should comply with local laws and electrical regulations requirements.

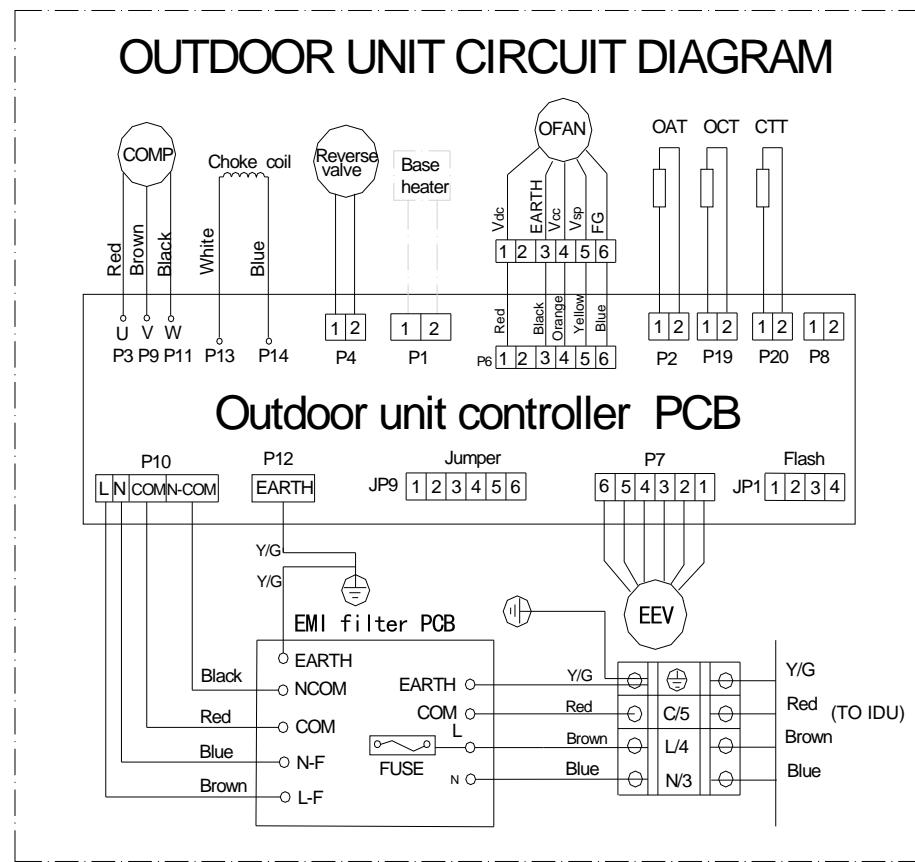
8. WIRING DIAGRAMS

8.1 HAD007, HAD009, HAD012 / GC 7, 9, 12 RC / GCD009, GCD012

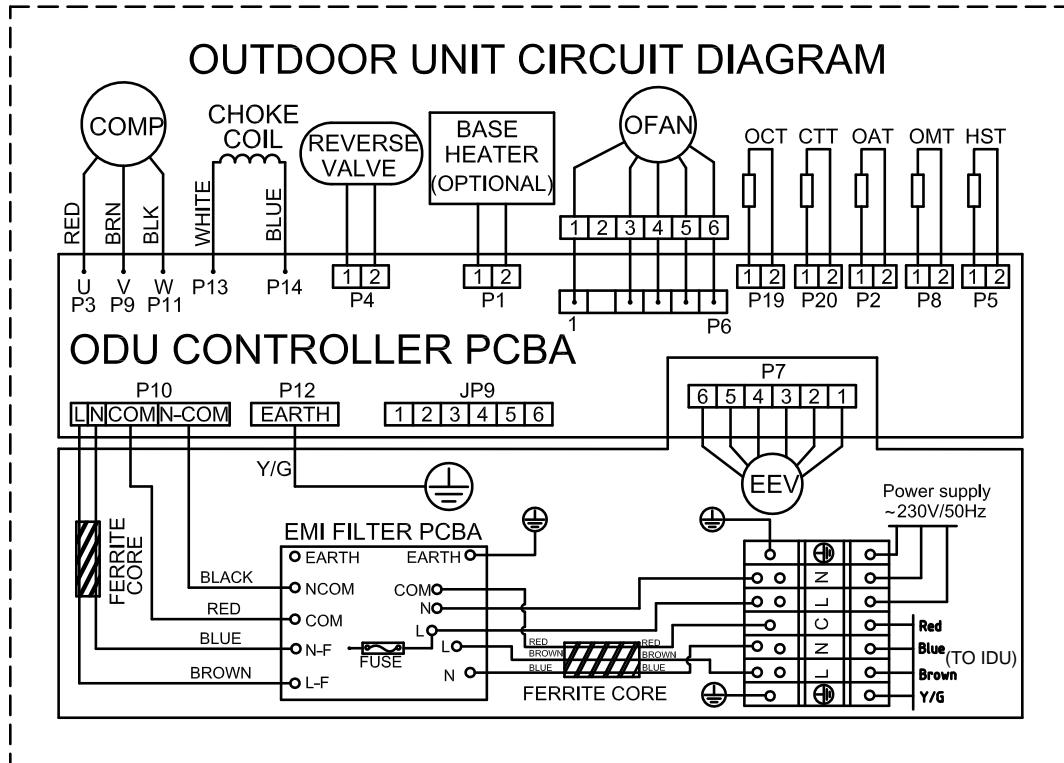


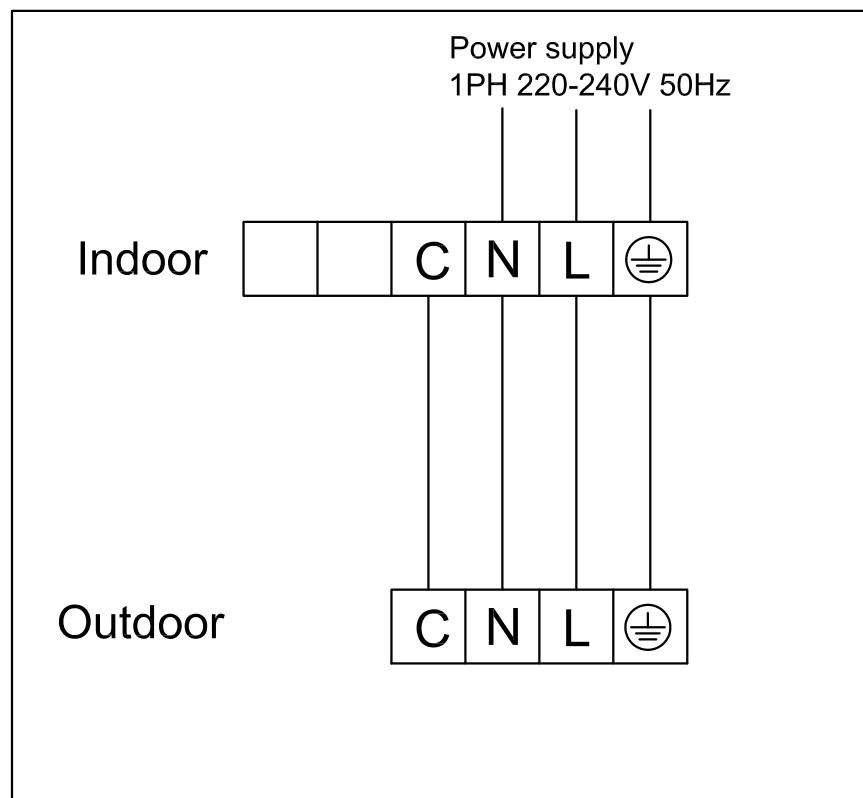
8.2 HAD018, HAD022**8.3 HAD024**

8.4 GC 18, GC 21

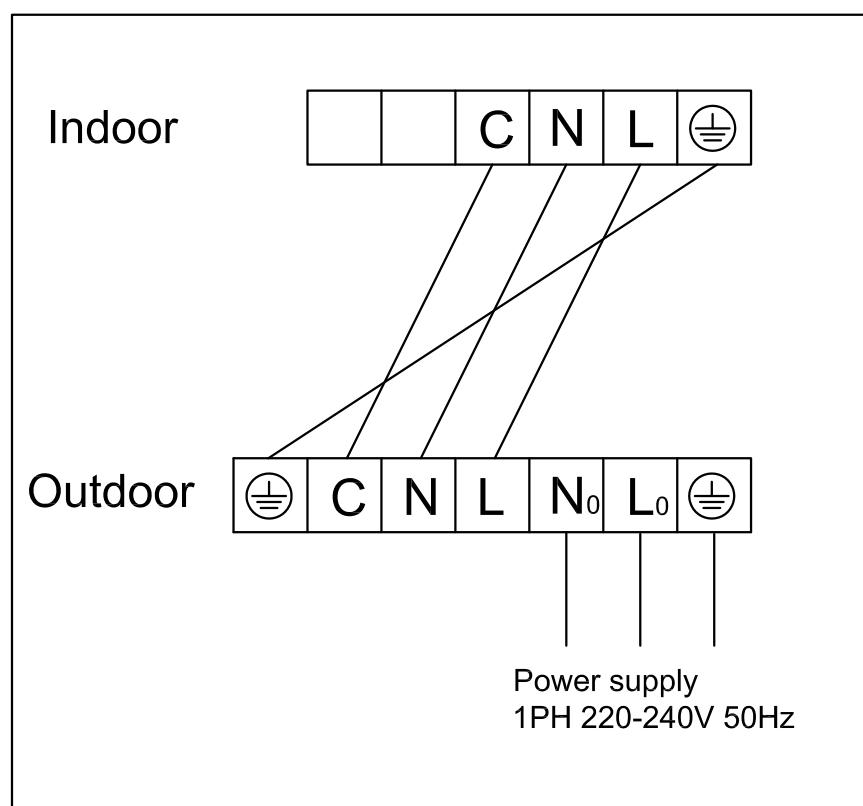


8.5 GC 24



8.6 Connection between indoor unit and outdoor unit

Power supply from indoor unit

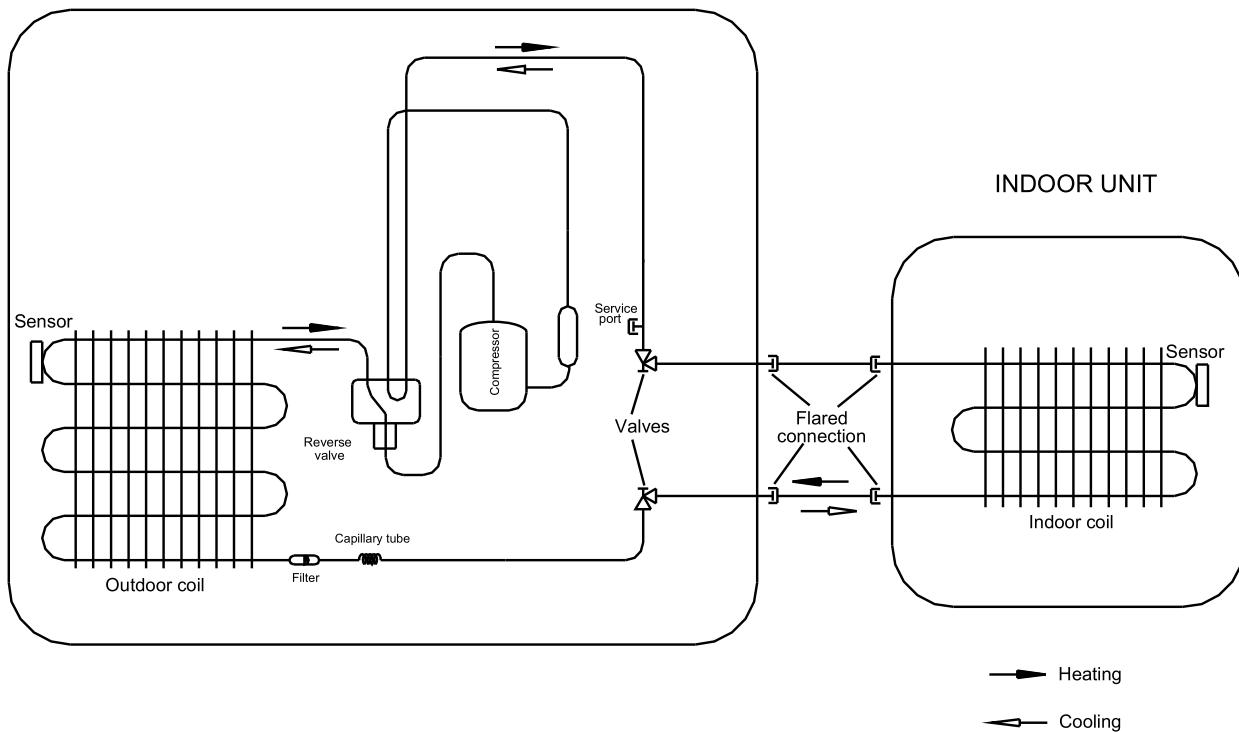


Power supply from outdoor unit

9. REFRIGERATION DIAGRAMS

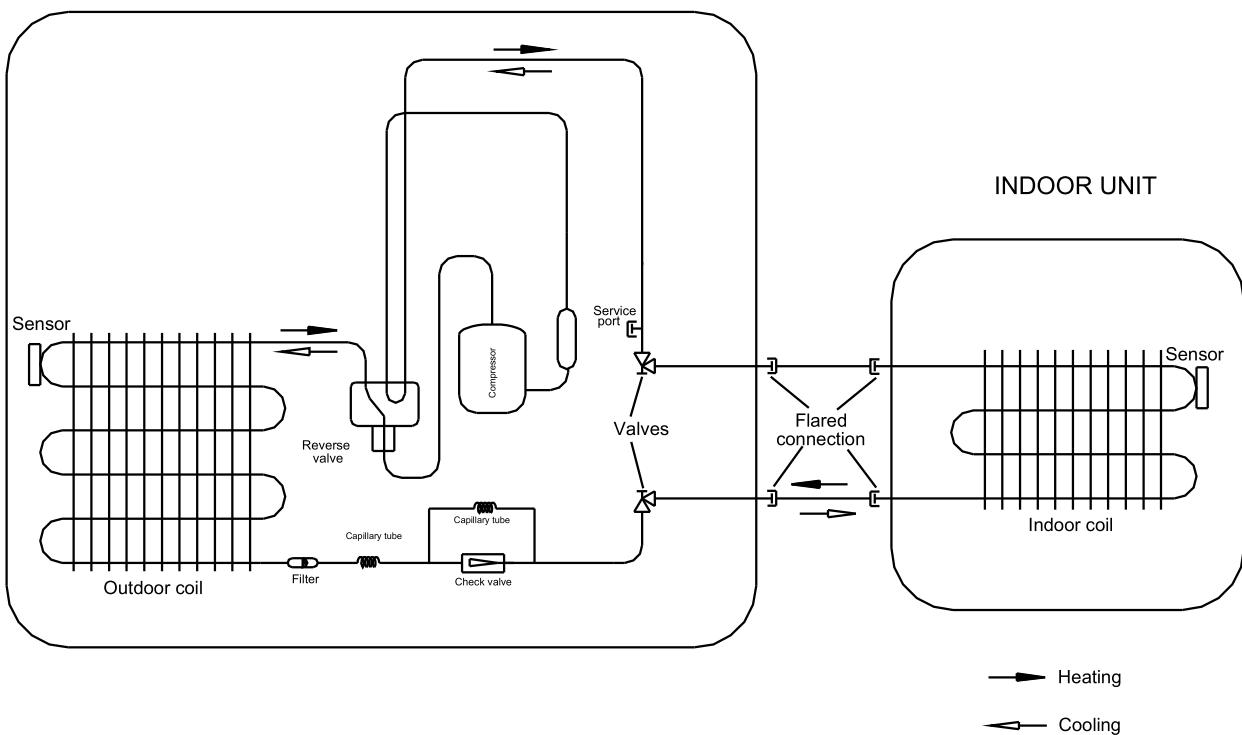
9.1 HAD009 Matching GCD009

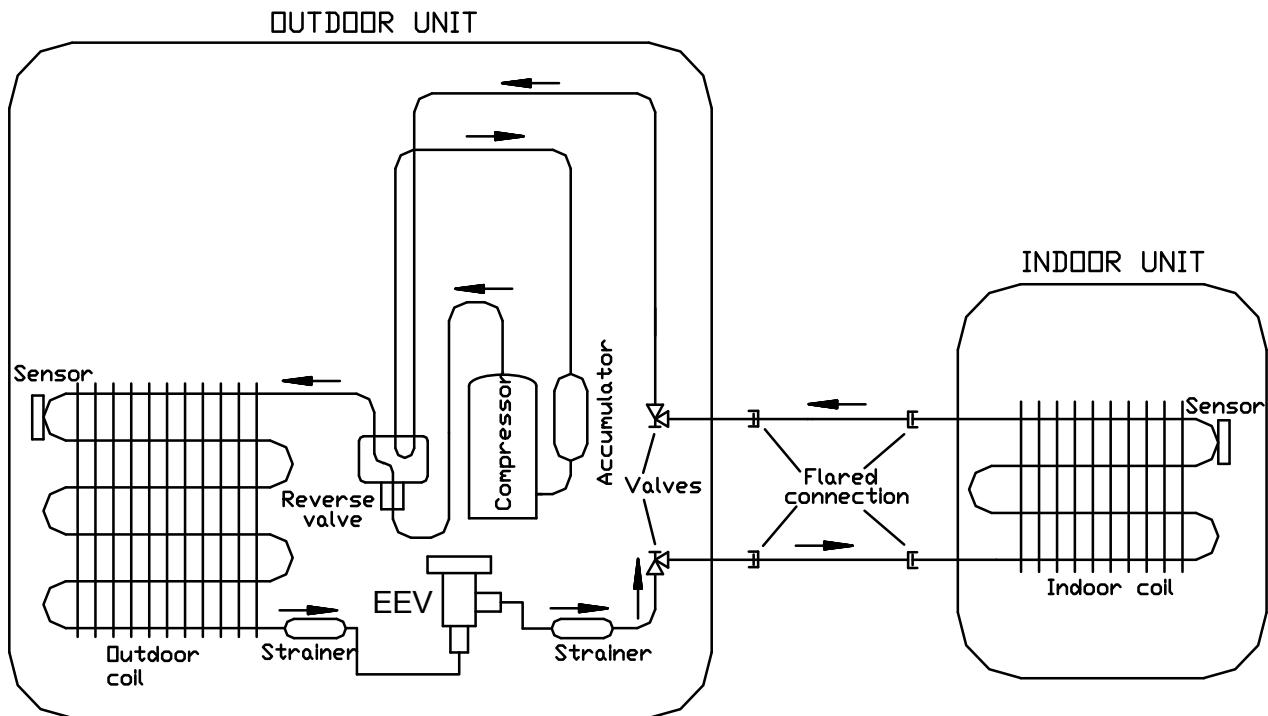
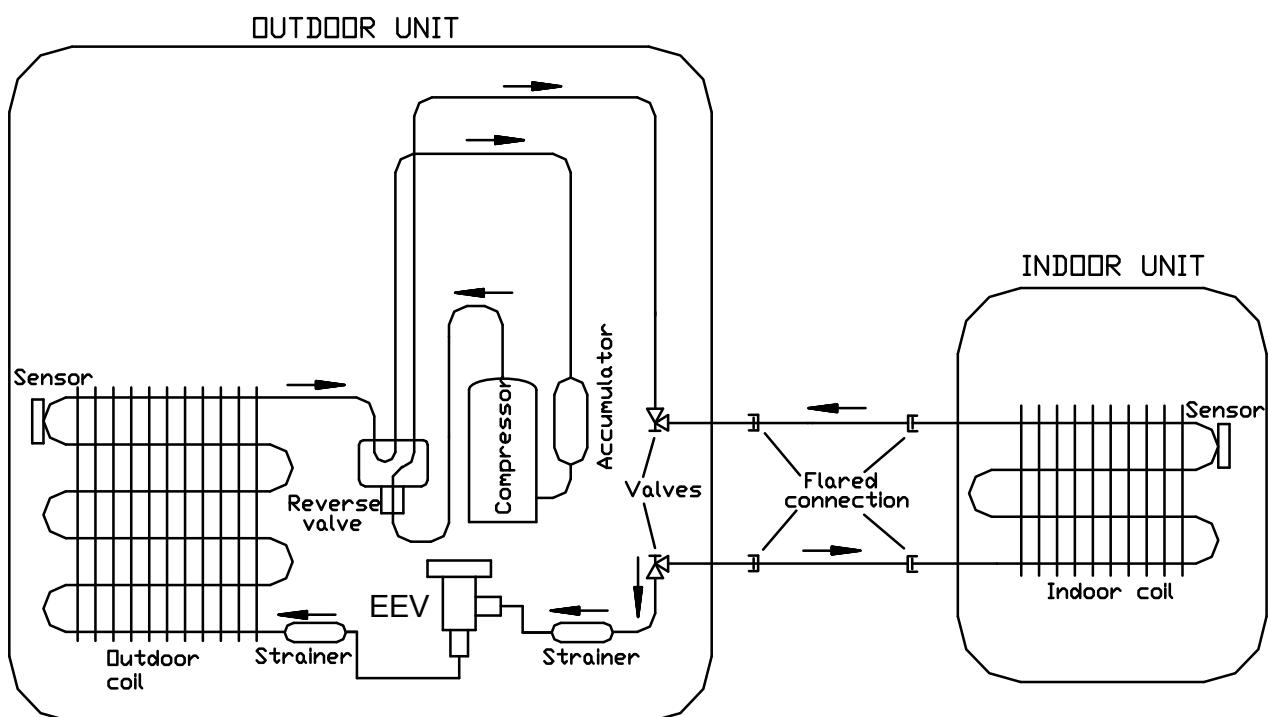
OUTDOOR UNIT



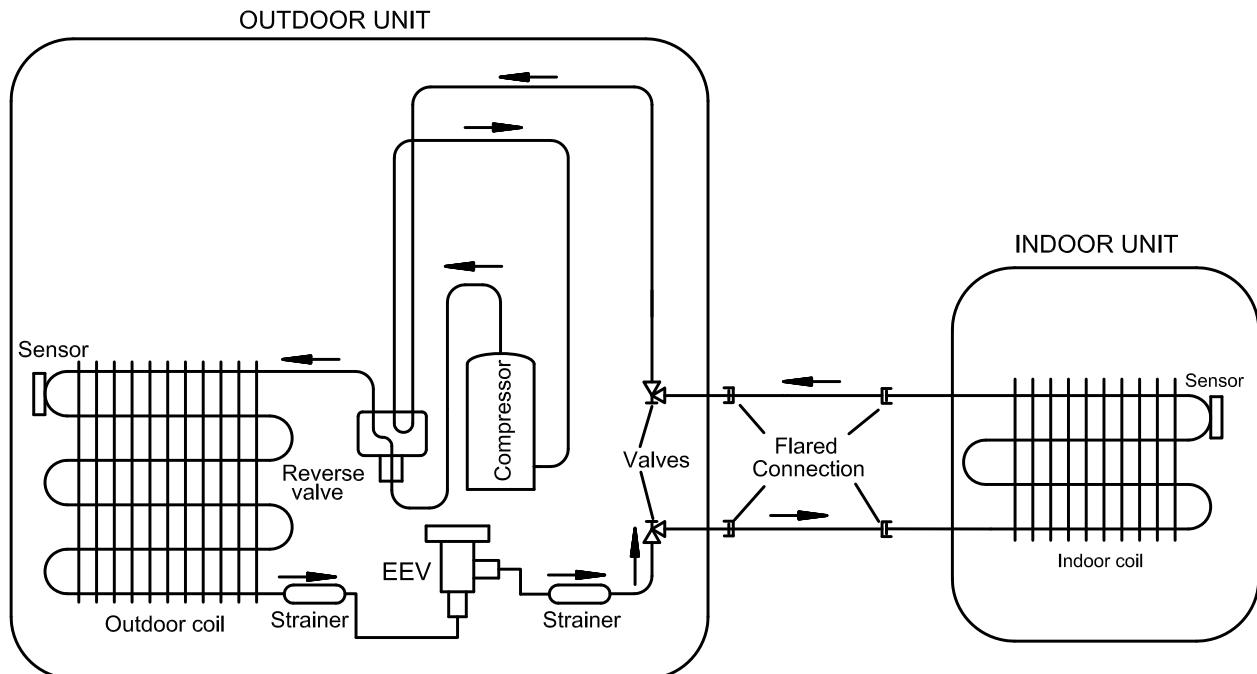
9.2 HAD012 Matching GCD012

OUTDOOR UNIT

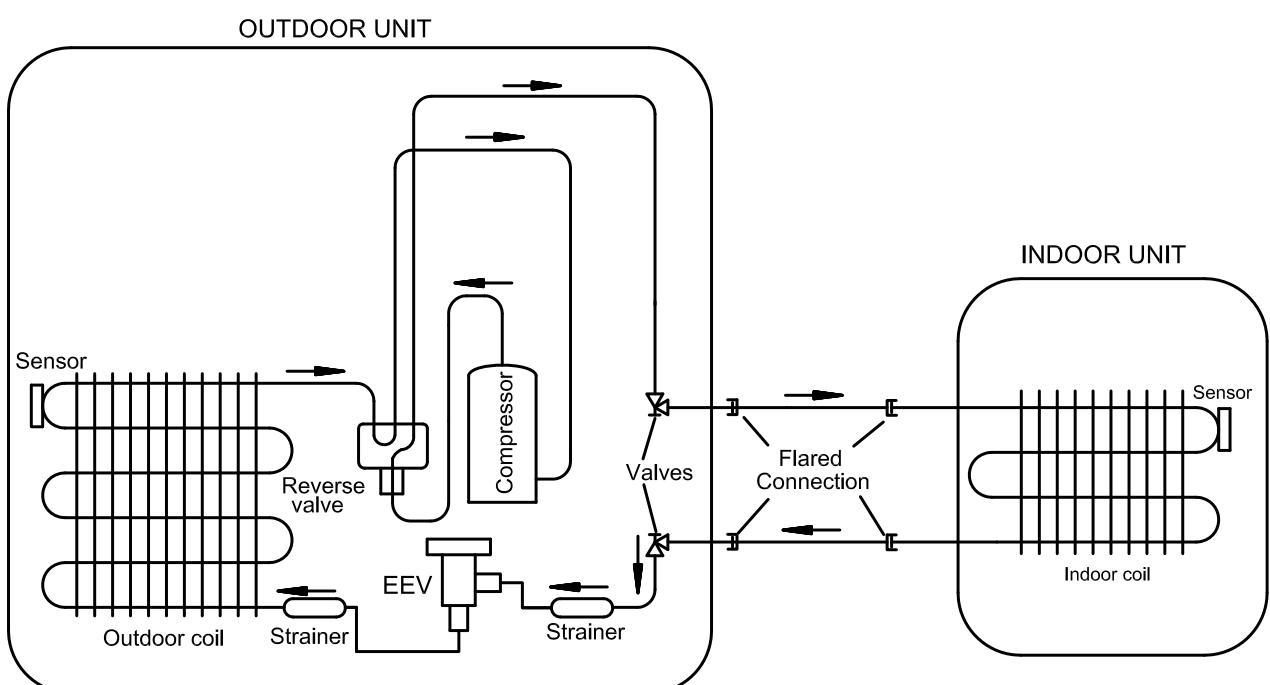


9.3 HAD007, HAD009, HAD012 Matching GC 7, GC 9, GC 12 RC DCI**COOLING & DRY MODE****HEATING MODE**

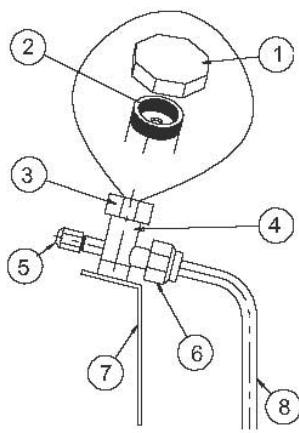
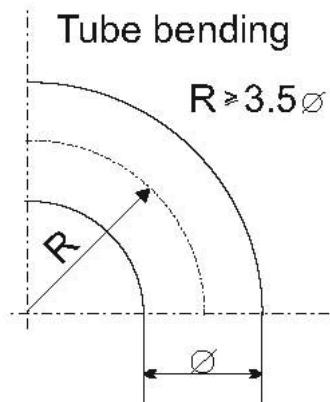
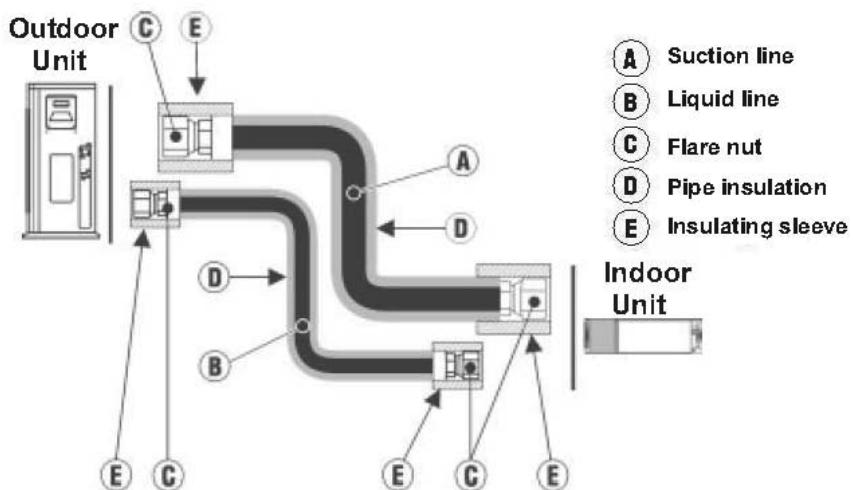
9.4 HAD018, HAD022, HAD024 Matching GC 18, GC 21, GC 24 Cooling



Heating



10. TUBING CONNECTIONS



TUBE (Inch)	$\frac{1}{4}''$	$\frac{3}{8}''$	$\frac{1}{2}''$	$\frac{5}{8}''$	$\frac{3}{4}''$
TORQUE (Nm)					
Flare Nuts	11-13	40-45	60-65	70-75	80-85
Valve Cap	13-20	13-20	18-25	18-25	40-50
Service Port Cap	11-13	11-13	11-13	11-13	11-13

1. Valve Protection Cap-end
2. Refrigerant Valve Port (use Allen wrench to open/close)
3. Valve Protection Cap
4. Refrigerant Valve
5. Service Port Cap
6. Flare Nut
7. Unit Back Side
8. Copper Tube

11. CONTROL SYSTEM [HAD007, HAD009, HAD012]

11.1 Electronic Control

11.1.1 General Functions and Operating Rules

The DCI software is fully parametric.

The parameters values are given in the last section of this control logic chapter of the service manual.

11.1.2 System Operation Concept

The control function is divided between indoor and outdoor unit controllers. Indoor unit is the system 'Master', requesting the outdoor unit for cooling/heating capacity supply. The outdoor unit is the system 'Slave' and it must supply the required capacity unless it enters into a protection mode avoiding it from supplying the requested capacity.

The capacity request is transferred via indoor to outdoor communication, and is represented by a parameter called 'NLOAD'. NLOAD is an integer number with values between 0 and 127, and it represents the heat or cool load felt by the indoor unit.

11.1.3 Compressor Frequency Control

11.1.3.1 NLOAD setting

The NLOAD setting is done by the indoor unit controller, based on a PI control scheme.

The actual NLOAD to be sent to the outdoor unit controller, is based on the preliminary LOAD calculation, the indoor fan speed, and the power shedding function.

NLOAD limits as a function of indoor fan speed:

Indoor Fan Speed	Maximum NLOAD Cooling	Maximum NLOAD Heating
Low	Max NLOADIF1C	127
Medium	Max NLOADIF2C	127
High	Max NLOADIF3C	127
Turbo	Max NLOADIF4C	127
Auto	Max NLOADIF5C	127

11.1.3.2 Target Frequency Setting

The compressor target frequency is a function of the NLOAD number sent from the indoor controller and the outdoor air temperature.

Basic Target Frequency Setting:

1. For S/W 37V3 and lower (For 453031000R Controller):

NLOAD	Target Frequency
127	Maximum frequency
10 < NLOAD < 127	Interpolated value between minimum and maximum frequency
10	Minimum frequency
0	Compressor is stopped

Target frequency limits as a function of outdoor air temperature (OAT):

OAT Range	Cool mode limits	Heat mode limits
OAT < 6		No limit
6 ≤ OAT < 20	MaxFreqAsOATC	MaxFreqAsOAT1H
20 ≤ OAT < 26		MaxFreqAsOAT2H
26 ≤ OAT	No limit	

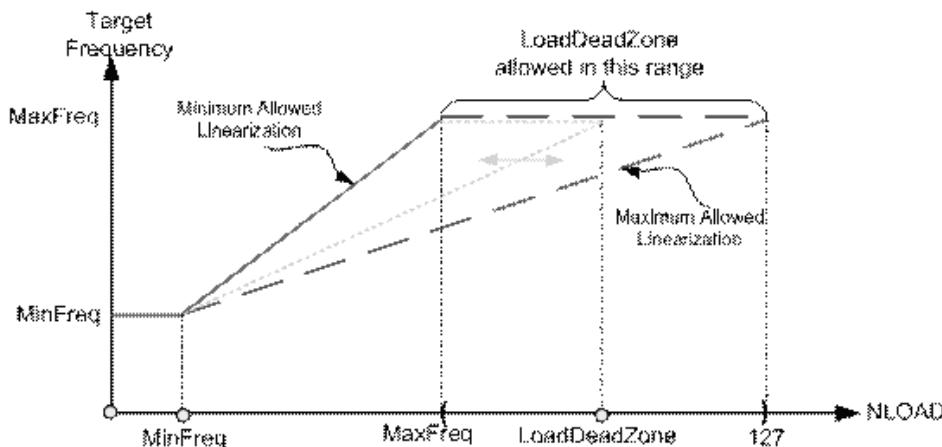
2. For S/W 370V and higher (For 467300225R Controller):

NLOAD	Target Frequency [Hz]
0	0
$0 < NLOAD \leq \text{MinFreq}$	MinFreq
$> \text{MinFreq}$	$\frac{\text{MaxFreq} - \text{MinFreq}}{\text{LoadDeadZone} - \text{MinFreq}} \cdot \{ \min(\text{NLOAD}, \text{LoadDeadZone}) - \text{MinFreq} \} + \text{MinFreq}$

Definitions		
	Cool	Heat
MinFreq	<i>MinFreqC</i>	<i>MinFreqH</i>
MaxFreq	<i>MaxFreqC</i>	<i>MaxFreqH</i>
LoadDeadZone	<i>LoadDeadZoneC</i>	<i>LoadDeadZoneH</i>

LoadDeadZone calculation

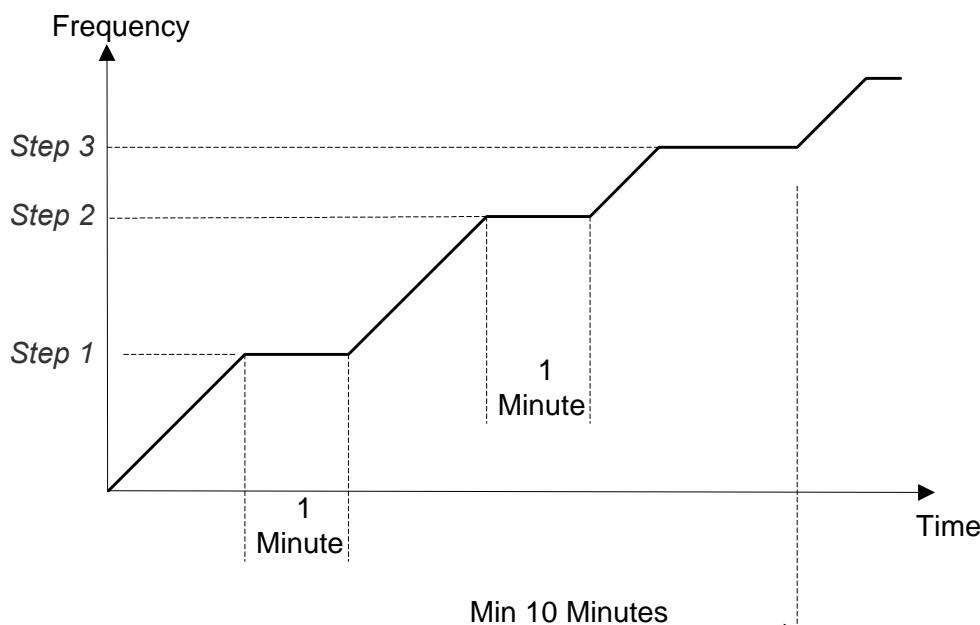
Refer to the following diagram for the above description:



11.1.3.3 Frequency Changes Control

Frequency change rate is 1 Hz/sec.

11.1.3.4 Compressor Starting Control



11.1.3.5 Minimum On and Off Time

3 minutes.

11.1.4 Indoor Fan Control

10 Indoor fan speeds are determined for each model. 5 speeds for cool/dry/fan modes and 5 speeds for heat mode.

When user sets the indoor fan speed to a fixed speed (Low/ Medium/ High), unit will operate constantly at set speed.

When Auto Fan is selected, indoor unit controller can operate in all speeds. The actual speed is set according to the cool/heat load.

11.1.4.1 Turbo Speed

The Turbo speed is activated during the first 30 minutes of unit operation when auto fan speed is selected and under the following conditions:

- Difference between set point and actual room temperature is bigger than 3 degrees.
- Room temperature > 22 for cooling, or < 25 for heating.

11.1.5 Heating Element Control

Heating element can be started if LOAD > 0.8 * MaximumNLOAD AND Indoor Coil temperature < 45.

The heating element will be stopped when LOAD < 0.5 * MaximumNLOAD OR if Indoor Coil temperature > 50.

11.1.6 Outdoor Fan Control

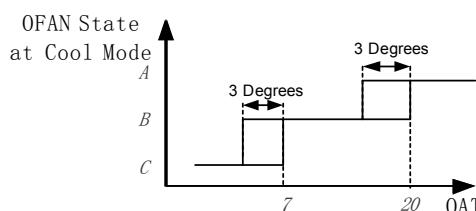
11.1.6.1 The following are the speeds types (General Rules):

1. For S/W 37V3 and lower (For 453031000R Controller)

The OFAN motor is an AC type that operates with 2 speeds (Low/High), controlled by Relays

OFAN speed depends on the compressor Target Frequency, and is set according to the following table and graphs below and OFAN can change its Speed only if it has been working in the current speed for at least 35 seconds:

		OFAN Speed			
Compressor Target Frequency		Normal cases State A at cool / Heat	State B at cool	State C at cool	OAT>15 °C at heat
Freq=0		OFF	OFF	OFF	OFF
10 ≤ Freq < OFLowFreq		Low	Low	Low	Low
OLowFreq ≤ Freq < OMMedFreq		High	Low	Low	Low
OMMedFreq ≤ Freq		High	Low	Low	High



Note: Priorities A>B>C

Notes:

When OAT is faulty or disabled OFAN will follow 'Normal cases' rules (left column).

1. The table above can be overruled during protections.
2. OFLowFreq = OFLowFreqC in cool mode, and OFLowFreqH in heat mode.
3. OFMedFreq = OFMedFreqC in cool mode, and OFMedFreqH in heat mode.
- The OFAN will be off when the compressor is off.
- An exception for the following rule is when compressor was operating in cool mode before stopped. In this case OFAN will remain on in low speed for 1 minute.
- Whenever the indoor unit is under indoor coil overheating protection, as long as the protection status is HzD2, the outdoor fan will change to off. It will be enabled to be back on when the status of this protection becomes normal.
- Upon receiving night mode signal (ON), through communication, the OFAN will be operating in LOW speed only in Cool. It will be back to its normal operation when receiving OFF signal.

For S/W 370V and higher (For 467300225R Controller)

11.1.6.2 OFAN Operation in Cooling Mode

With keeping the OFAN general rules above in the highest priority, the operation of the OFAN will be operating as the following:

OAT _{Initial}	Time After Compressor start up (minutes)	
	0 – 3min	> 3min
OAT _{Initial} >20 (or Faulty)	High(Relay)	<p>High (Relay)</p> <p>Note: OAT fault, use High Speed</p>
OAT _{Initial} ≤20	Low(Triac)- Open Loop	<p>Low (Triac)- By CDT</p> <p>Note: OAT fault, use High Speed</p>

Note:
The OAT_{Initial} value represents one OAT reading exactly **at the moment start up** (actual freq>0).
Low (Triac)- By OMT represents the operation of the Low Fan speed controlled by Triac according to OMT sensor.

CDT=max (OMT,OCT)

When in low (By CDT), the OFAN will reduce the speed

Whenever CDT is low, and

11.1.6 OFAN operation in heating mode

The outdoor fan will always be running at High speed during heating operation mode.

OFAN operation under Protections

The OFAN will switch to High Speed in the following cases:

1. Cooling mode AND
2. Compressor On (actual frequency>0).

HST, CTT, CDT, Current protections at HzDown1 or HzDown2 statuses

11.1.7 EEV (electronic Expansion valve) Control

1. For S/W 37V3 and lower (For 453031000R Controller)

- EEV opening is defined as $EEV = EEV_{OL} + EEV_{CV}$
- EEV_{OL} is the initial EEV opening as a function of the compressor frequency, operation mode, unit model and capacity.
- EEV_{CV} is a correction value for the EEV opening that is based on the compressor temperature.
- During the first 5 minutes of compressor operation $EEV_{CV} = 0$.
- Once the first 5 minutes are over, the correction value is calculated as follow:
$$EEV_{CV}(n) = EEV_{CV}(n-1) + EEV_{CTT}$$
- EEV_{CTT} is the correction based on the compressor temperature. A target compressor temperature is set depending on frequency and outdoor air temperature, and the actual compressor temperature is compared to the target temperature to set the required correction to the EEV opening.

2. For S/W 370V and higher (For 467300225R Controller)

The EEV will be operating according to the discharge super heat value.

Whenever the discharge super heat is too high, the EEV will be opening.

Whenever the discharge super heat is too low, the EEV will be closing.

In cooling, the discharge super heat is calculated by CTT-OMT

In heating, the discharge super heat is calculated by CTT-ICT

Normal values of discharge super heat

Cooling: 18°C-35°C

Heating: 15°C-32°C

11.1.8 Reversing Valve (RV) Control

Reversing valve is on in heat mode.

Switching of RV state is done only after compressor is off for over 3 minutes.

11.2 Fan Mode

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the difference between actual room temperature and user set point temperature.

11.3 Cool Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PID control.

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

11.4 Heat Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

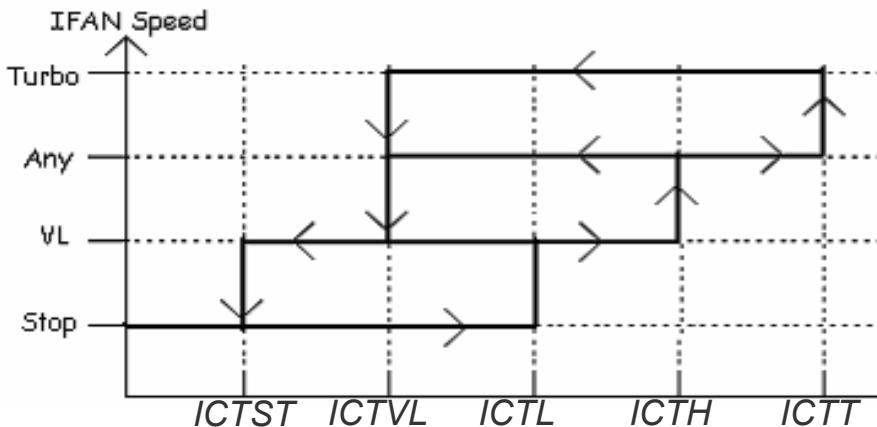
In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

11.4.1 Temperature Compensation

4 degrees are reduced from RT sensor temperature reading (excluding I-Feel mode), to compensate for temperature difference between high and low areas in the heated room, and due to coil heat radiation on RT sensor.

11.4.2 Indoor Fan Control in Heat Mode

Indoor fan speed depends on the indoor coil temperature:



11.5 Auto Cool/Heat Mode

When in auto cool heat mode unit will automatically select between cool and heat mode according to the difference between actual room temperature and user set point temperature (ΔT).

Unit will switch from cool to heat when compressor is off for 3 minutes, and $\Delta T < -3$.

Unit will switch from heat to cool when compressor is off for 5 minutes, and $\Delta T < -3$.

11.6 Dry Mode

As long as room temperature is higher than the set point, indoor fan will work in low speed and compressor will work between 0 and *MaxNLOADIF1C* Hz.

When the room temperature is lower than the set point, compressor will be switched OFF and indoor fan will cycle 3 minutes OFF, 1 minute ON.

11.7 Protections

There are 5 protection codes.

Normal (Norm) – unit operate normally.

Stop Rise (SR) – compressor frequency can not be raised but does not have to be decreased.

HzDown1 (D1) – Compressor frequency is reduced by *Down1* Hz/min.

HzDown2 (D2) – Compressor frequency is reduced by *Down2* Hz/min.

Stop Compressor (SC) – Compressor is stopped.

11.7.1 Indoor Coil Defrost Protection

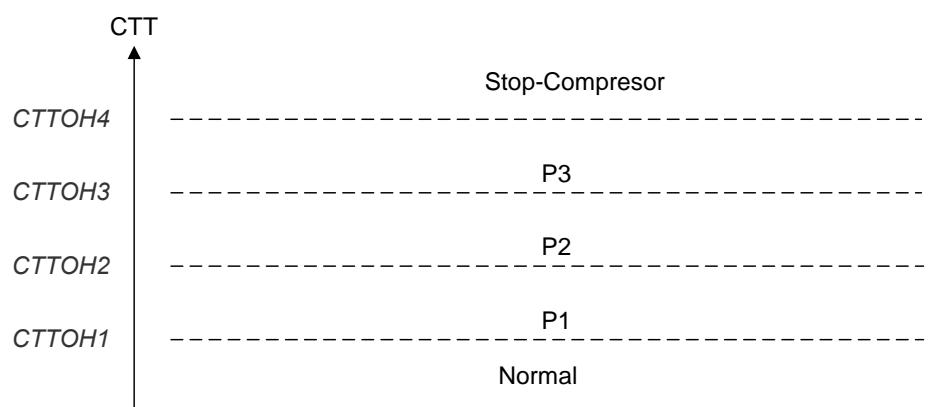
ICT	ICT Trend				
	Fast Increasing	Increasing	No change	Decreasing	Fast Decreasing
ICT < -2	SC	SC	SC	SC	SC
-2 ≤ ICT < 0	D1	D1	D2	D2	D2
0 ≤ ICT < 2	SR	SR	D1	D2	D2
2 ≤ ICT < 4	SR	SR	SR	D1	D2
4 ≤ ICT < 6	Norm	Norm	SR	SR	D1
6 ≤ ICT < 8	Norm	Norm	Norm	SR	SR
8 ≤ ICT	Normal				

11.7.2 Indoor Coil over Heating Protection

ICT	ICT Trend				
	Fast Decreasing	Decreasing	No Change	Increasing	Fast Increasing
ICT > 55	SC	SC	SC	SC	SC
53 < ICT ≤ 55	D1	D1	D2	D2	D2
49 < ICT ≤ 53	SR	SR	D1	D2	D2
47 < ICT ≤ 49	SR	SR	SR	D1	D2
45 < ICT ≤ 47	Norm	Norm	SR	SR	D1
43 < ICT ≤ 45	Norm	Norm	Norm	SR	SR
ICT ≤ 43	Normal				

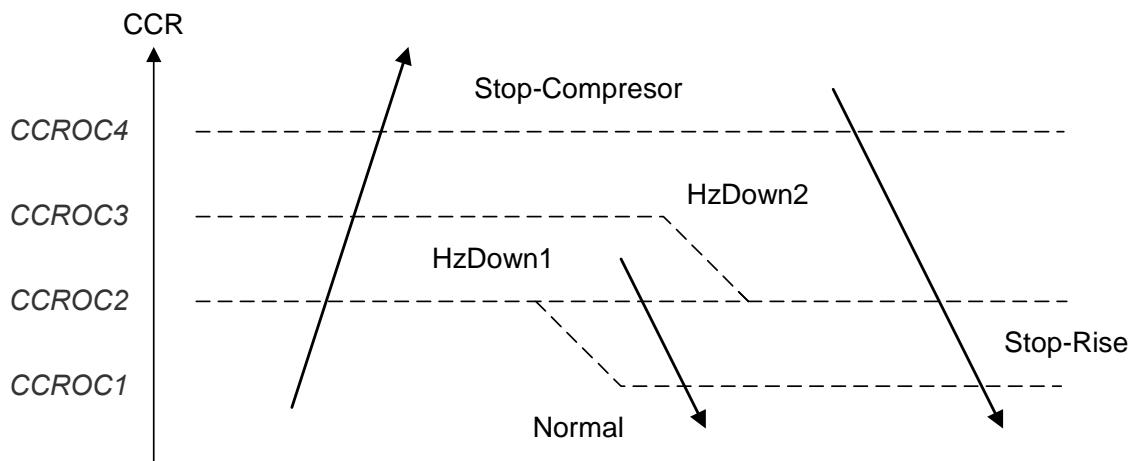
11.7.3 Compressor over Heating Protection

Compressor temperature can be in one of 5 control zones (4 in protection, and 1 normal), according to the following chart.



Control Status	Compressor Temperature Increases	Else
P1	Norm	SR
P2	D1	SR
P3	D2	D1
Stop Compressor	SC	

11.7.4 Compressor over Current Protection



11.7.5 Heat Sink Over Heating Protection

HST	HST Trend		
	Decreasing	No Change	Increasing
HST > 90	SC	SC	SC
85 < HST ≤ 90	D1	D2	D2
82 < HST ≤ 85	SR	D1	D2
80 < HST ≤ 82	SR	SR	D1
78 < HST ≤ 80	Norm	Norm	SR
HST ≤ 78	Normal		

Outdoor Coil Overheating Protection

CDT_n is the current reading of CDT and CDT_{n-1} is the last reading of CDT.

CDT_n	$CDT_n - CDT_{n-1}$				
	<-1	-1	0	1	>1
$CDT > CDT HSTOH5$	SC	SC	SC	SC	SC
$CDTOH4 \leq CDT_n < CDT OH5$	D1	D1	D2	D2	D2
$CDTOH3 \leq CDT_n < CDT OH4$	SR	SR	D1	D2	D2
$CDTOH2 \leq CDT_n < CDT OH3$	SR	SR	SR	D1	D1
$CDTOH1 \leq CDT_n < CDT OH2$	Norm	Norm	Norm	SR	SR
$CDT_n < CDT OH1$	Norm				

(*) **Normal (Norm)** – No protection status is ON.

Stop-Rise (SR) – System is in protection.

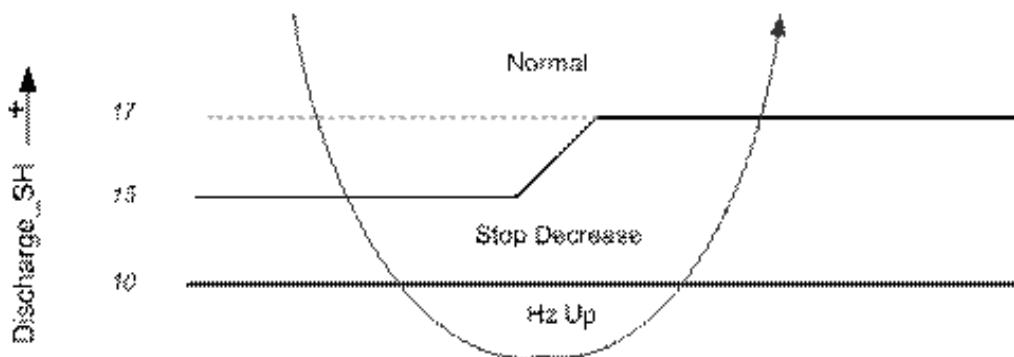
HzDown1 (D1) - System is in protection.

HzDown2 (D2) - System is in protection.

DISCHARGE SUPER HEAT PROTECTION

For S/W 370V and higher (For 467300225R Controller)

Since this model does not have EEV, the discharge superheat is controlled by adjusting the compressor frequency through the down to up protection



For cooling: Discharge super heat = CTT-CDT

For heating: Discharge super heat = CTT-ICT

(Where CDT=MAX(OCT,OMT)

Normal – No protection status is ON

Stop-Decrease – System is in protection. Compressor frequency is not allowed to decrease

HzUp – System is in protection. Compressor frequency is increased by 3 Hz/min

11.7.6 Outdoor Coil Deicing Protection

11.7.6.1 Deicing Starting Conditions

1. For S/W 37V3 and lower (For 453031000R Controller)

Deicing operation will start when either one of the following conditions exist

Deicing operation will start when either one of the following conditions exist:

- Case 1: OCT < OAT – 8 AND TLD > DI
- Case 2: OCT < OAT_{max} – 12 AND TLD > 30 minutes.
- Case 3: OCT <-1 AND TLD> 100 mnutes.
- Case 4: OCT is Invalid AND TLD > DI
- Case 5: NLOAD = 0 AND OCT < OAT - 8
- Case 6: OCT<-19 AND TLD>60min:

When OATmax >0 or OAT is invalid; then DST=8

When OATmax ≤0; then DST= round down (-0.8 * OATmax) + 8

OATmax calculation:

After compressor starts for 3 minutes, OATmax calculation is start.

The OATmax is the moving value of the Maximum OAT during the 1st 10mintues within last 30minutes

OCT – Outdoor Coil Temperature

OAT – Outdoor Air Temperature

TLD – Time from Last Deicing

DI – Deicing Interval (Time Interval Between Two Deicing)

Deicing interval time when compressor is first started in heat mode, is 10 minutes if OCT < -2, and is 40 minutes in other cases.

Deicing interval time is changed (increased/ decreased in 10 minutes steps) as a function of deicing time. If deicing time is shorter then former deicing time, the deicing interval time will be increased. If deicing time is longer then former deicing time, the deicing interval time will be decreased.

2. For S/W 370V and higher (For 467300225R Controller)

Deicing operation will start when either one of the following conditions exist:

- Case 1: OCT < DST AND TLD > DI
- Case 2: OCT < OATmax – 12 AND TLD > DI.
- Case 3: OCT is Invalid AND TLD > DI
- Case 4: Unit is just switched to STBY AND OCT < DST
- Case 5: NLOAD = 0 AND OCT < DST
- Case 6: OCT<-1 AND TLD>100min

DST Definition:

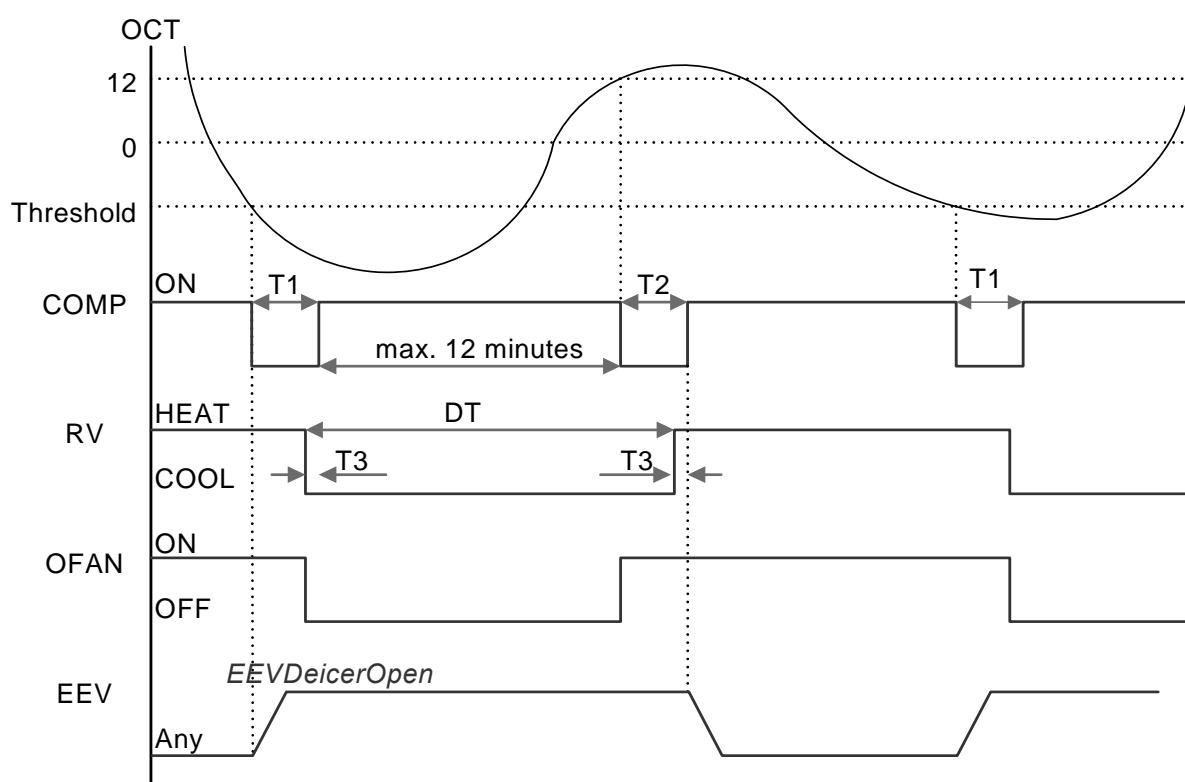
When OATmax>0, then DST=8

When OATmax<=0, then DST= -0.8 X OATmax+8

OATmax=Rolling/Moving

Max. of OAT during the 10 mins before the last 20 mins

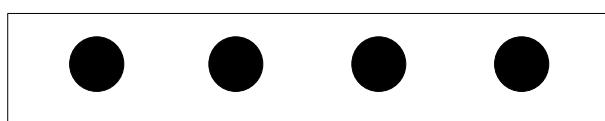
11.7.6.2 Deicing Protection Procedure



T1 = DEICT1, T2 = DEICT2, T3 = DEICT3

11.7.7 Condensate Water Over Flow Protection

P1 P2 P3 P4



Level Connector Top View

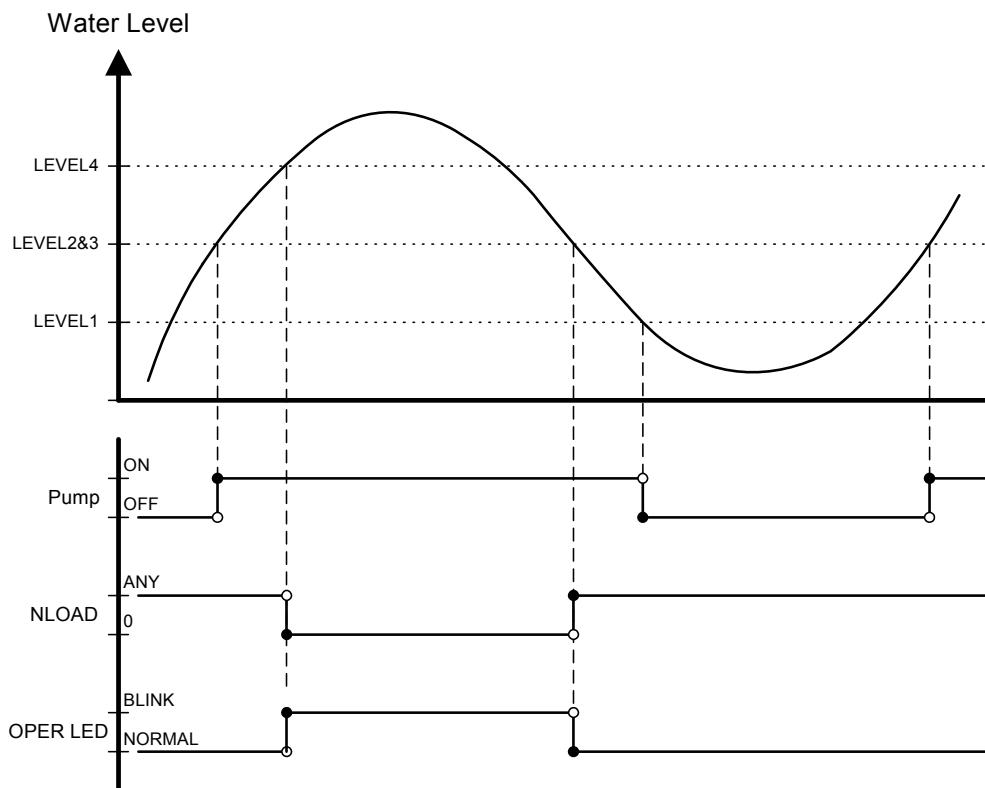
Each of the pins P1, P2, P3 can have two options:

1 – When it is shorted with P4

0 – When it is not shorted to P4

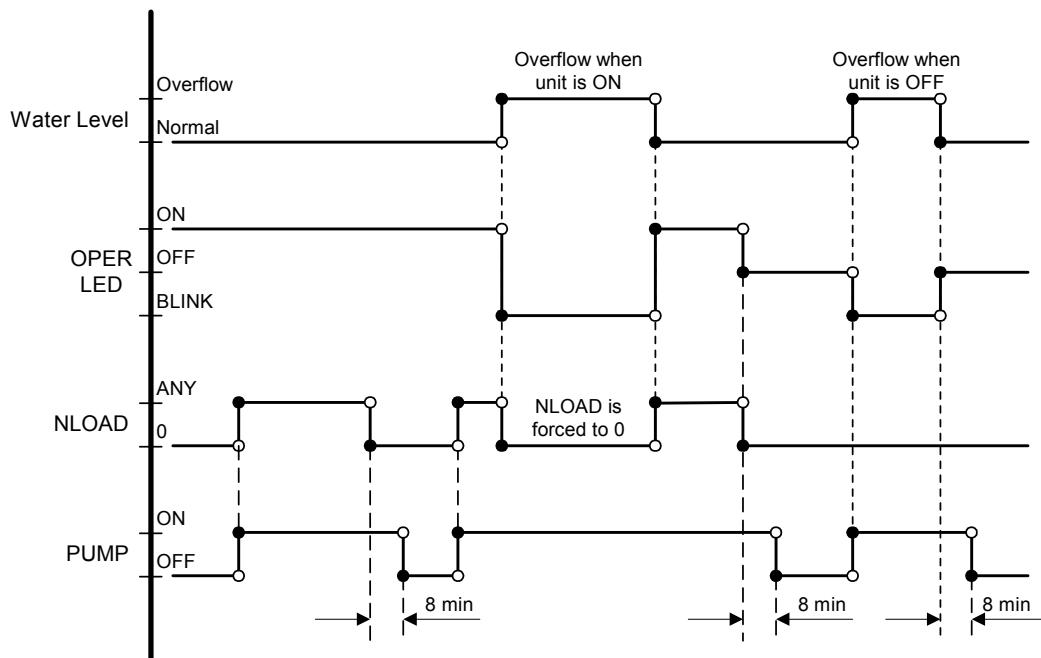
11.7.7.1 3 Levels Logic (used in floor/ceiling models)

P2	P3	Level
0	0	L0
1	0	L1
1	1	L2&3
0	1	L4



11.7.7.2 1 Level Logic (used in all models except for floor/ceiling models)

P2	P3	Level
Don't care	1	Normal
Don't care	0	Overflow



11.8 Indoor Unit Dry Contact

Indoor unit Dry contact has two alternative functions that are selected by J8.

	Function	Contact = Open	Contact = Short
J8 = Open	Presence Detector Connection	No Limit	Forced to STBY
J8 = Short	Power Shedding Function	No Limit	Limit NLOAD

11.9 Operating the Unit from the Mode Button

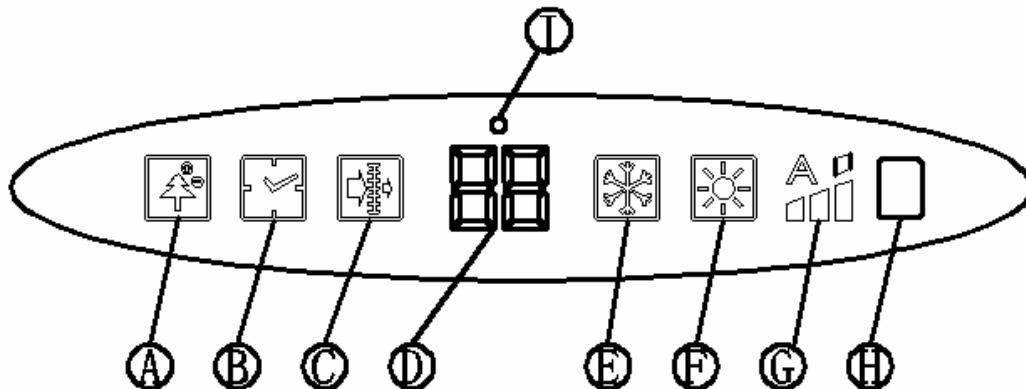
Forced operation allows to start, stop and operate in Cooling or Heating, in pre-set temperature according to the following table:

Forced operation Mode	Pre-set Temperature
Cooling	20°C
Heating	28°C

11.10 On Unit Controls and Indicators

11.10.1 Indoor Unit Controller Controls and Indicators For All Models

The following is schematic drawing for the display:



- A ----- Ionizer
- B ----- Timer
- C ----- Filter
- D ----- Temperature Icon
- E ----- Cool Icon
- F ----- Heat Icon
- G ----- Fan Speed
- H ----- Infra-Red (IR) receiver
- I ----- Standby LED

Operation Indication	<ol style="list-style-type: none"> 1. Cool ICON Lights up during Cool, Dry or Auto modes (not Fan). Even though the mode can be changed automatically from Auto Cool to Auto Heat, the Cool will light on. 2. Heat ICON Lights up in Red color during heat mode. It will not light up during Auto Heat mode. 3. Blinks continuously during Indoor/Outdoor protections (according to the relevant spec section). During heating the Heat Icon blinks. In Cool, Dry, Or Auto modes the Cool Icon blinks.
Mode/Reset Button	<p>As long as the filter counter is bigger than 0, the Mode/Reset button functions as Mode switch. Once filter counter is 0, the Mode/Reset button functions as Reset switch.</p> <p>Mode Function: Every short pressing , the next operation mode is selected, in this order: SB → Cool Mode → Heat Mode → SB → ... In long pressing system enters diagnostic mode (refer to diagnostic mode Sect.)</p> <p>Reset Function: For short pressing: Reset the filter counter. Refer to the diagram above for the filter LED operation.</p>
7 segment LEDs	<p>Refer to the diagram above. During diagnostics mode the 7 segment LED will show the fault code (refer to diagnostics Section).</p>

11.10.2 Outdoor Unit Controller Indicators

Unit has three LED's.

SB LED is ON when power is ON (230 VAC,even when no communication).

STATUS LED is ON when COMP is ON, and Blinks according to diagnostics mode definitions when either fault or protection occurs.

FAULT LED Blinks according to diagnostics mode definitions when either fault or protection occurs.

11.11 Jumper Settings

11.11.1 Indoor Unit Controller

11.11.1.1 Hardware Jumpers

0 = Open Jumper (disconnect jumper).

1 = Close Jumper (connect jumper).

Self test Jumper – J1

OPERATION	J1
SELF-TEST	1
NORMAL	0

Family selection Jumper – J2

HW	Model	J2 (Default)	Compensation
Use Jumper	-WNG/WNG18/WNG30/	0	Activated
Use Model Plug	PXD/AC/NPXD	1	Deactivated
Use Model Plug/ DIP switch	LS/K/KS /AD/DNG/KN/CN _A /CN _B / 'EMD 4-5 hp/DS 4-5 hp' DNG 4-5 hp / KN 4-5-6 hp / CD 5-6 hp LSN _A /LSN _B /TOP DCI/NKN HAD _A /HAD _B /Delta _A /Delta _B	1	Activated

Model selection Jumper – J3, J4

Model	J3	J4
A	0	0
B	0	1
C	1	0
D	1	1

11.11.1.2 Software Jumpers

Property	0	1	2
EEPROM DATA (J1)	Use ROM*	Use EEPROM	NA
'Thermostatic Stop- Heat' (J2)	Deactivated	Activated	NA
'Heat to STBY' (J3)	Deactivated	Activated	NA
Water Level Protection (J4)	1 Level	3 Levels	No Water Protection-ignore
Enable Test Mode (J5)	Deactivated	Activated*	NA

* Default values (used in the ROM)

Default SW jumpers according to the family (used in the ROM)

Property	HAD007 / HAD009 / HAD012
'Thermostatic Stop- Heat' (J2)	0
'Heat to STBY' (J3)	1

J1 – EEPROM/ROM setting

When J1 is 1, IDU will use model/family/general parameters from EEPROM. If EEPROM is invalid, IDU will ignore J1 and use/copy the ROM pointed by the selected jumpers (will also set an according fault).

11.11.2 Outdoor Unit Controller**For S/W 37V3 and lower (For 453031000R Controller)****11.11.2.1 Hardware Jumpers**JP9 JUMPER LAYOUT

EEPROM Data (PIN 9)	ODU3 (PIN 7)	ODU2 (PIN 5)	ODU1 (PIN 3)	ODU0 (PIN 1)
GND (PIN 10)	GND (PIN 8)	GND (PIN 6)	GND (PIN 4)	GND (PIN 2)

ODU MODEL SELECTION

ODU3	ODU2	ODU1	ODU0	ODU Model
OFF	OFF	OFF	OFF	Reserved
OFF	OFF	OFF	ON (PIN1 & PIN2)	A (Single DCR 20)
OFF	OFF	ON (PIN3 & PIN4)	OFF	B (Single DCR 25)
OFF	OFF	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	C (Single DCR 35)
OFF	ON (PIN5 & PIN6)	OFF	OFF	D
OFF	ON (PIN5 & PIN6)	OFF	ON (PIN1 & PIN2)	E (Duo DCI 50)
OFF	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	OFF	F
OFF	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	G
ON (PIN7 & PIN8)	OFF	OFF	OFF	H
ON (PIN7 & PIN8)	OFF	OFF	ON (PIN1 & PIN2)	I
ON (PIN7 & PIN8)	OFF	ON (PIN3 & PIN4)	OFF	J
ON (PIN7 & PIN8)	OFF	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	K
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	OFF	OFF	L
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	OFF	ON (PIN1 & PIN2)	M
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	OFF	N
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	O

PCB JUMPER SETTING FOR J2 HEAD

RXD (PIN 2)	TEST (PIN 4)	GND (PIN 6)
VCC (PIN 1)	N/C (PIN 3)	TXD100 (PIN 5)

1. Connect **PIN 4** and **PIN 6** to enter Built-in-Test.
2. RXD, TXD100, VCC is for MegaTools connection.

PCB JUMPER J1 HEADER

J1 header is used for program flash.

11.11.2.2 Software Jumpers

Property	0	1
EEPROM DATA (J1)	Use ROM*	Use EEPROM

* Default values (used in the ROM)

J1 – EEPROM/ROM setting

When J1 is 1, ODU will use model/general parameters from EEPROM. If EEPROM is invalid, ODU will ignore J1 and use/copy the ROM pointed by the selected jumpers (will also set an according fault).

For S/W 370V and higher (For 467300225R Controller)**Hardware Jumpers**

JP9 JUMPER LAYOUT

EEPROM Data	ODU3(PIN 7)	ODU2(PIN 5)	ODU1(PIN 3)	ODU0(PIN 1)
GND (PIN 10)	GND (PIN 8)	GND (PIN 6)	GND (PIN 4)	GND (PIN 2)

ON is defined as shorted, while OFF is defined as disconnected.

ODU MODEL SELECTION

ODU3	ODU2	ODU1	ODU0	ODU Model	Compressor Type
OFF	OFF	OFF	OFF	Reserved	
OFF	OFF	OFF	ON	A (Single DCR 22- Use Capillary)	Toshiba-DA89 (4 Poles)
OFF	OFF	ON	OFF	B (Single DCR 25- Use Capillary)	Toshiba-DA89 (4 Poles)
OFF	OFF	ON	ON	C (Single DCR 35- Use Capillary)	Toshiba- DA108 (4 Poles)
OFF	ON	OFF	OFF	D (Reserved)	
OFF	ON	OFF	ON	E (Single DCR 22- Use EEV)	Panasonic-5RS092 (6 Poles)
OFF	ON	ON	OFF	F (Single DCR 25- Use EEV)	Panasonic-5RS092 (6 Poles)
OFF	ON	ON	ON	G (Single DCR 35- Use EEV)	Panasonic-5RS102(6 Poles)
ON	OFF	OFF	OFF	H	
ON	OFF	OFF	ON	I	
ON	OFF	ON	OFF	J	
ON	OFF	ON	ON	K	
ON	ON	OFF	OFF	L	
ON	ON	OFF	ON	M	
ON	ON	ON	OFF	N	
ON	ON	ON	ON	O	

PCB JUMPER SETTING FOR J2 HEADER

RXD (PIN 2)	TEST (PIN 4)	GND (PIN 6)
VCC (PIN 1)	N/C (PIN 3)	TXD100 (PIN 4)

1. Connect **PIN 4** and **PIN 6** to enter Built-in-Test.
2. RXD, TXD100, VCC is for MegaTools connection.

PCB JUMPER J1 HEADER

J1 header is used for program flash.

Software Jumpers

Property	0	1
EEPROM DATA (J1)	Use ROM*	Use EEPROM

* Default values (used in the ROM)

J1 – EEPROM/ROM setting

When J1 is 1, ODU will use model/general parameters from EEPROM. If EEPROM is invalid, ODU will ignore J1 and use/copy the ROM pointed by the selected jumpers (will also set an according fault).

11.12 Test Mode

11.12.1 Entering Test Mode

System can enter Test mode in two ways:

- Automatically when the following conditions exists for 30 minutes continuously:
 - Mode = Cool, Set point = 16, Room temperature = 27 ± 1 , Outdoor temperature = 35 ± 1
- Or
 - Mode = Heat, Set point = 30, Room temperature = 20 ± 1 , Outdoor temperature = 7 ± 1
- Manually when entering diagnostics with the following settings:
 - Mode = Cool, Set point = 16
 - Mode = Heat, Set point = 30

11.12.2 Unit Operation in Test Mode

In test mode, the unit will operate in fixed settings according to the indoor fan speed setting:

Indoor Fan Speed Setting	Unit Setting
Low	Minimum Capacity Setting
High	Nominal Capacity Setting
Auto	Maximum Capacity Setting

During test mode, protections are disabled, except for stop compressor status.

11.13 SW Parameters

11.13.1 Indoor Units SW Parameters

11.13.1.1 General Parameters for All Models:

Parameters defining the indoor fan speed as a function of Indoor Coil temperature in heat mode (ICT):

ICTST Speed	ICT to stop indoor fan	25
ICTVLSpeed	ICT to go down to very low speed	28
ICTLSpeed	ICT to start in very low speed	30
ICTHSpeed	ICT to start in increase speed from very low	32
ICTTSpeed	ICT to enable Turbo fan speed	40

Parameters for defrost protection:

ICTDef1	ICT to go back to normal	8
ICTDef2	ICT to 'stop rise' when ICT decrease	6
ICTDef3	ICT to 'stop rise' when ICT is stable	4
ICTDef4	ICT to 'Hz Down' when ICT decrease	2
ICTDef5	ICT to 'Hz Down' when ICT is stable	0
ICTDef6	ICT to stop compressor	-2

Parameters for indoor coil over heating protection:

ICTOH1	ICT to go back to normal	45
ICTOH2	ICT to 'stop rise' when ICT increase	48
ICTOH3	ICT to 'stop rise' when ICT is stable	52
ICTOH4	ICT to 'Hz Down' when ICT increase	55
ICTOH5	ICT to 'Hz Down' when ICT is stable	60
ICTOH6	ICT to stop compressor	62

11.13.1.2 Model Depended Parameters:

Parameter name	Models		
	007	009	012
NLOAD limits as a function of selected indoor fan speed			
MaxNLOADIF1C	40	40	40
MaxNLOADIF2C	55	51	55
MaxNLOADIF3C	127	127	127
MaxNLOADIF4C	127	127	127
MaxNLOADIF5C	127	127	127
Indoor Fan speeds			
IFVLOWC	700	700	700
IFLOWC	750	800	750
IFMEDC	900	1000	950
IFHIGHC	1050	1150	1150
IFTURBOC	1200	1250	1250
IFVLOWH	700	700	700
IFLOWH	850	900	900
IFMEDH	950	1000	1050
IFHIGHH	1100	1200	1200
IFTURBOH	1250	1350	1300
Nominal Compressor Frequency			
NomLoadC	44	51	62
NomLoadH	53	50	61

11.13.2 Outdoor Units SW Parameters

For S/W 37V3 and lower (For 453031000R Controller)

Parameter Name	GCD007	GCD009	GCD012
Compressor Parameters			
MinFreqC	35	35	35
MaxFreqC	52	62	70
MinFreqH	38	35	40
MaxFreqH	67	73	66
Step1Freq	40	43	45
Step2Freq	50	55	55
Step3Freq	63	63	65
Frequency limits as a function of outdoor air temperature			
MaxFreqAsOATC	44	50	60
MaxFreqAsOAT1H	53	58	60
MaxFreqAsOAT2H	45	50	50
Compressor Over Heating Protection			
CTTOH1	94	94	94
CTTOH2	98	98	98
CTTOH3	102	102	102
CTTOH4	105	105	105
CTTOH5	120	120	120
Compressor Over Current Protection [A]			
CCR01	40	40	40
CCR02	42	42	42
CCR03	44	44	44
CCR04	47	47	47
Outdoor Fan Speed (RPM)			
OFLWC	610	600	600
OFMEDC	700	760	760

For S/W 370V and higher (For 467300225R Controller)

Parameter Name	GC 7 RC DCI (EEV)	GC 9 RC DCI (EEV)	GC 12 RC DCI (EEV)	GCD009 (Capillary)	GCD012 (Capillary)
Compressor Parameters					
MinFreqC	20	20	20	20	20
MaxFreqC	52	70	75	65	78
MinFreqH	25	25	25	28	28
MaxFreqH	67	75	75	67	75
Step1Freq	37	37	37	37	37
Step2Freq	46	46	46	46	46
Step3Freq	60	60	65	60	65
Frequency limits as a function of outdoor air temperature					
MaxFreqAsOATC	52	70	75	65	78
MaxFreqAsOAT1H	60	65	65	60	65
MaxFreqAsOAT2H	40	40	40	40	40
Compressor Over Heating Protection					
CTTOH1	94	94	94	94	94
CTTOH2	98	98	98	98	98
CTTOH3	102	102	102	102	102
CTTOH4	105	105	105	105	105
Compressor Over Current Protection [A]					
CCR01	28	35	40	36	36
CCR02	30	37	42	39	39
CCR03	32	39	44	42	42
CCR04	35	42	47	46	46
Outdoor Fan Speed (RPM)					
OFC	700	760	760	830	830

11.13.3 Remote Control DIP Switch Settings

DEFINITION		SETTING SWITCH STATUS			
RC4	RC3	SW. NO. 4	SW. NO. 3	SW. NO. 2	SW. NO. 1
RC-ALL MODES OF OPERATION		--	--	OFF	OFF
STD-COOL, FAN, DRY, ACTIVE		--	--	OFF	ON
HEAT-COOL, FAN, DRY, ACTIVE		--	--	ON	OFF
AUTO FAN (AF)		--	--	ON	ON
VERTICAL SWING ONLY	TEMP. DISPLAY IN °C DEGREES	--	OFF	--	--
HORIZONTAL & VERTICAL SWING FUNCTIONS TOGETHER	TEMP. DISPLAY IN °F DEGREES	--	ON	--	--
DISABLE LCD & KEY ILLUMINATION	TIMER & CLOCK 12H AM, PM	OFF	--	--	--
ENABLE LCD & KEY ILLUMINATION	TIMER & CLOCK 24H	ON	--	--	--

Reset operation - Press the 4 buttons simultaneously: "CLEAR", "SET", "HR +", "HR -" for 5 seconds

LEGEND

SW1, SW2 - Selection of RC/ST

SW3 – Selection of Display °C or °F in RC3 or swing function in RC4

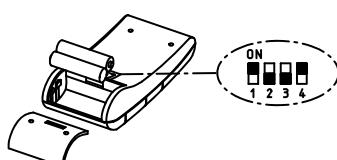
SW4 – Selection of Time Display 12H AM/PM or 24H in RC3 or illumination in RC4

OFF = 0

ON = 1

NOTE

After setting the DIP switches perform reset operation.



12. TROUBLESHOOTING [HAD007, HAD009, HAD012]

12.1 ELECTRICAL & CONTROL TROUBLESHOOTING

WARNING!!!

When Power Up – the whole outdoor unit controller, including the wiring, is under HIGH VOLTAGE!!!

Never open the Outdoor unit before turning off the Power!!!

When turned off, the system is still charged (400V)!!!

It takes about 4 Min. to discharge the system.

Touching the controller before discharging may cause an electrical shock!!!

For safe handling of the controller please refer to section 15.1.6 below.

12.1.1 Single Split system failures and corrective actions

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1	Power supply indicator (Red LED) does not light up.	No power supply	Check power supply. If power supply is OK, check display and display wiring. if OK, replace controller.
2	Unit does not respond to remote control message	Remote control message not reached the indoor unit	Check remote control batteries, if batteries are OK, check display and display wiring, if OK, replace display PCB. If still not OK replace controller.
3	Unit responds to remote control message but Operate indicator (Green LED) does not light up	Problem with display PCB	Replace display PCB. If still not OK replace controller.
4	Indoor fan does not start (louvers are opened and Green LED does light up)	Unit in heat mode and coil is still not warm.	Change to cool mode and check.
		Problem with PCB or capacitor	Change to high speed and Check power supply to motor is higher than 130VAC (for triack controlled motor) or higher than 220VAC for fixed speed motors, if OK replace capacitor, if not OK replace controller
5	Indoor fan works when unit is OFF, and indoor fan speed is not changed by remote control command.	PCB problem	Replace controller
6	Compressor does not start	Electronics control problem or protection	Perform diagnostics (See 15.1.3 below), and follow the actions described.
7	Compressor stops during operation and Green LED remains on	Electronic control or power supply problem	Perform diagnostics (See 15.1.3 below), and follow the actions described.

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
8	Compressor is on but outdoor fan does not work	Problem with outdoor electronics or outdoor fan	Check outdoor fan motor according to the procedure in section 15.1.5.3 below, if not OK replace controller
9	Unit works in wrong mode (cool instead of heat or heat instead of cool)	Electronics or power connection to RV	Check RV power connections, if OK, Check RV operation with direct 230VAC power supply, if OK, Replace outdoor controller.
10	All components are operating properly but no cooling or no heating	Refrigerant leak	Check refrigeration system.
11	Compressor is over heated and unit does not generate capacity	EEV problem	Check EEV
12	Units goes into protections and compressor is stopped with no clear reason	Control problem or refrigeration system problem	Perform diagnostics (See 15.1.3 below), and follow the actions described.
13	Compressor motor is generating noise and no suction occurs	Phase order to compressor is wrong	Check compressor phase order.
14	Water leakage from indoor unit	Indoor unit drainage tube is blocked	Check and open drainage tube.
15	Freezing of outdoor unit in heat mode and outdoor unit base is blocked with ice		Connect base heater.
16	Unit operates with wrong fan speeds or wrong frequency	Wrong jumper settings	Perform diagnostics (See 15.1.3 below), and check if units is operating by EEPROM parameters.

12.1.2 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in Test Mode (in Test mode, system operates in fixed settings). The performance curves given in this manual are given for unit performance in test mode when high indoor fan speed is selected.

Entering test mode:

Set unit to Cool/16 degrees/High indoor fan speed, or Heat/30 degrees/High indoor fan speed, and enter diagnostics.

12.1.3 Judgment by Indoor/Outdoor Unit Diagnostics

Enter diagnostics mode - press for five seconds Mode/Reset button in any operation mode. Acknowledgment is by 3 short beeps and lights of all Display LED's. Then, The units will enter into Indoor and Outdoor unit diagnostic modes.

During the Outdoor unit diagnostics all three Indoor LED's (STBY/Operate, Filter and Timer) are blinking. When Indoor diagnostics is displayed, all three LED's (STBY/Operate, Filter and Timer) are ON.

When system enters diagnostics mode, only one fault code is shown. Order of priority is from the lower to the higher number. Diagnostics is continuously ON as long as power is ON. The current system operation mode will not be changed.

If no fault occurred in the system, no fault code will be displayed during normal operation mode. The last fault code will be displayed even if the system has recovered from that fault. The last fault will be deleted from the EEPROM after the system has exit diagnostics mode.

In diagnostics mode, system fault / status will be indicated by blinking of Filter & Timer LEDs. The coding method will be as follows:

Filter LED will blink 5 times in 5 seconds, and then will be shut off for the next 5 seconds.
Timer LED will blink during the same 5 seconds according to the following Indoor / Outdoor unit tables:

Note: 0 – OFF, 1-ON

15.1.3.1 Indoor unit Diagnostics

No	Problem	AO	5	4	3	2	1
1	ICT is disconnected	Yes	0	0	0	0	1
2	ICT is shorted	Yes	0	0	0	1	0
3	RAT is disconnected	Yes	0	0	0	1	1
4	RAT is shorted	Yes	0	0	1	0	0
5	Reserved (for MSMP used as RGT fault)	No	0	0	1	0	1
6	ICTE shorted/disconnected (when enabled)	Yes	0	0	1	1	0
7	Undefined IDU Family/Model	Yes	0	0	1	1	1
8	No Communication	Yes	0	1	0	0	0
9	No Encoder	No	0	1	0	0	1
10	Reserved	No	0	1	0	1	0
11	Outdoor Unit Fault	No	0	1	0	1	1
...	Reserved	No					
17	Defrost protection	No	1	0	0	0	1
18	Deicing Protection	No	1	0	0	1	0
19	Outdoor Unit Protection	No	1	0	0	1	1
20	Indoor Coil HP Protection	No	1	0	1	0	0
21	Overflow Protection	Yes	1	0	1	0	1
22	Reserved	No					
24	EEPROM Not Updated	No	1	1	0	0	0
25	Bad EEPROM	No	1	1	0	0	1
26	Bad Communication	No	1	1	0	1	0
27	Using EEPROM data	No	1	1	0	1	1
28	Model A	No	1	1	1	0	0
29	Model B	No	1	1	1	0	1
30	Model C	No	1	1	1	1	0
31	Model D	No	1	1	1	1	1

Yes AO => Alarm Operation

15.1.3.2 Indoor unit diagnosis and corrective actions

No.	Fault	Probable Cause	Corrective Action
1	Sensor failures of all types		Check sensor connections or replace sensor
2	Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
3	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
4	No Encoder	Indoor electronics or motor	Check motor wiring, if ok, replace motor, if still not ok, replace Indoor controller.
5	Outdoor Unit Fault	Outdoor controller problem	Switch to Outdoor diagnostics.
6	EEPROM Not Updated	System is using ROM parameters and not EEPROM parameters	No action, unless special parameters are required for unit operation.
7	Bad EEPROM		No action, unless special parameters are required for unit operation.
8	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding
9	Using EEPROM data	No problem. System is using EEPROM parameters	

15.1.3.3 Outdoor unit Diagnostics

No	Problem	5	4	3	2	1
1	OCT is disconnected	0	0	0	0	1
2	OCT is shorted	0	0	0	1	0
3	CTT is disconnected	0	0	0	1	1
4	CTT is shorted	0	0	1	0	0
5	HST is disconnected (when enabled)	0	0	1	0	1
6	HST is shorted (when enabled)	0	0	1	1	0
7	OAT is disconnected (when enabled)	0	0	1	1	1
8	OAT is shorted (when enabled)	0	1	0	0	0
9	TSUC is disconnected (when enabled)	0	1	0	0	1
10	TSUC is shorted (when enabled)	0	1	0	1	0
11	IPM Fault	0	1	0	1	1
12	Bad EEPROM	0	1	1	0	0
13	DC under voltage	0	1	1	0	1
14	DC over voltage	0	1	1	1	0
15	AC under voltage	0	1	1	1	1
16	Indoor / Outdoor unit Communication mismatch	1	0	0	0	0
17	No Communication	1	0	0	0	1
18	Reserved	1	0	0	1	0
20	Heat sink Over Heating	1	0	1	0	0
21	Deicing	1	0	1	0	1
22	Compressor Over Heating	1	0	1	1	0
23	Compressor Over Current	1	0	1	1	1
...	Reserved					
27	Bad Communication	1	1	0	1	1

15.1.3.4 Outdoor unit diagnosis and corrective actions

For S/W 37V3 and lower (For 453031000R Controller)

No.	Fault	Probable Cause	Corrective Action
1	Sensors failures of all types		Check sensors connections or replace sensors.
2	IPM Fault	Electronics HW problem	Check all wiring and jumper settings, if OK, replace electronics.
3	Bad EEPROM		No action, unless special parameters are required for unit operation.
4	DC under/over Voltage	Electronics HW problem	Check outdoor unit power supply voltage
5	AC under Voltage		Check outdoor unit power supply voltage
6	Indoor / Outdoor unit Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
7	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
8	Compressor Lock		Switch unit to STBY and restart
9	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding

For S/W 370V and higher (For 467300225R Controller)

No	Problem	AO	5	4	3	2	1
1	OCT shorted/disconnected	Yes	0	0	0	0	1
2	CTT shorted/disconnected	Yes	0	0	0	1	0
3	HST shorted/disconnected	Yes	0	0	0	1	1
4	OAT shorted/disconnected	Yes	0	0	1	0	0
5	OMT shorted/disconnected	Yes	0	0	1	0	1
6	Reserved (for Multi Split RGT shorted/disconnected)	No	0	0	1	1	0
7	Reserved (for Multi Split RLT shorted/disconnected)	No	0	0	1	1	1
8	Reserved	No	0	1	0	0	0
9	Reserved	No	0	1	0	0	1
10	Reserved	No	0	1	0	1	0
11	IPM Fault	Yes	0	1	0	1	1
12	Reserved	No	0	1	1	0	0
13	DC under voltage	Yes	0	1	1	0	1
14	Reserved	No	0	1	1	1	0
15	Zero Crossing detection fault	Yes	0	1	1	1	1
16	Mismatch between IDU & ODU models	Yes	1	0	0	0	0
17	No Communication	Yes	1	0	0	0	1
18	Reserved	No	1	0	0	1	0
20	Heat sink Over Heating	No	1	0	1	0	0
21	Deicing	No	1	0	1	0	1
22	Compressor Over Heating	No	1	0	1	1	0
23	Compressor Over Current	No	1	0	1	1	1
24	Reserved	No	1	1	0	0	0
25	Reserved	No	1	1	0	0	1
26	Compressor Lock	Yes	1	1	0	1	0
27	Bad Communication	No	1	1	0	1	1
28	Missing ODU configuration	Yes	1	1	1	0	0
29	Undefined ODU Model	Yes	1	1	1	0	1
30	Outdoor Coil Overheating	No	1	1	1	1	0
31	Operation condition is exceeded	Yes	1	1	1	1	1

Yes AO => Alarm Operation

12.1.4 Judgement by MegaTool

MegaTool is a special tool to monitor the system states.

Using MegaTool requires:

- A computer with RS232C port.
- A connection wire for MegaTool.
- A special MegaTool software.

Use MegaTool according to following procedure:

- Setup MegaTool software: copy the software to the computer.
- Connect RS232C port in computer with MegaTool port in Indoor/Outdoor unit controller by the connection wire.
- Run the software and choose the COM port, you can monitor the A/C system state in monitor tab.

12.1.5 Simple procedures for checking the Main Parts

12.1.5.1 Checking Mains Voltage.

Confirm that the Mains voltage is between 198 and 264 VAC. If Mains voltage is out of this range, abnormal operation of the system is expected. If in range check the Power (Circuit) Breaker and look for broken or loosed cable lugs or wiring mistake(s).

12.1.5.2 Checking Power Input.

If Indoor unit power LED is unlighted, power down the system and check the fuse of the Indoor unit. If the fuse is OK replace the Indoor unit controller. If the fuse has blown, replace the fuse and power up again.

Checking Power Input procedure for the Outdoor unit is the same as with the Indoor unit.

12.1.5.3 Checking the Outdoor Fan Motor.

Enter Test Mode (where the OFAN speed is high)

Check the voltage between lead wires according to the normal value as following:

- Between red wire and black wire: 310VDC +/- 20V
- Between orange wire and black wire: 15VDC +/- 1V
- Between yellow wire and black wire: 2-6VDC

12.1.5.4 Checking the Compressor.

The compressor is brushless permanence magnetic DC motor. Three coil resistance is same. Check the resistance between three poles. The normal value should be below 0.5 ohm (TBD).

12.1.5.5 Checking the Reverse Valve (RV).

Running in heating mode, check the voltage between two pins of reverse valve connector, normal voltage is 220VAC.

15.1.5.1 Checking the electrical expansion valve (EEV).

The EEV has two parts, drive part and valve. The drive part is a step motor; it is ringed on the valve. Check the drive voltage (12VDC). When Outdoor unit is power on, EEV shall run and have click and vibration.

12.1.6 Precaution, Advise and Notice Items

12.1.6.1 High voltage in Outdoor unit controller.

Whole controller, including the wires that are connected to the Outdoor unit controller may have the potential hazard voltage when power is on. Touching the Outdoor unit controller may cause an electrical shock.

Advise: Don't touch the naked lead wire and don't insert finger, conductor or anything else into the controller when power is on.

12.1.6.2 Charged Capacitors

Three large-capacity electrolytic capacitors are used in the Outdoor unit controller. Therefore, charging voltage (380VDC) remains after power down. Discharging takes about four minutes after power is off. Touching the Outdoor unit controller before discharging may cause an electrical shock.

12.1.6.3 Additional advises

- When disassemble the controller or the front panel, turn off the power supply.
- When connecting or disconnecting the connectors on the PCB, hold the whole housing, don't pull the wire.

There are sharp fringes and sting on shell. Use gloves when disassemble

13. CONTROL SYSTEM [HAD018, HAD022]

13.1 General Functions and Operating Rules

The DCI software is fully parametric.

All the model dependent parameters are shown in Blue color and with Italic style [*parameter*].

The parameters values are given in the last section of this control logic chapter of the service manual.

13.1.1 System Operation Concept

The control function is divided between indoor and outdoor unit controllers. Indoor unit is the system 'Master', requesting the outdoor unit for cooling/heating capacity supply. The outdoor unit is the system 'Slave' and it must supply the required capacity unless it enters into a protection mode avoiding it from supplying the requested capacity.

The capacity request is transferred via indoor to outdoor communication, and is represented by a parameter called 'NLOAD'. NLOAD is an integer number with values between 0 and 127, and it represents the heat or cool load felt by the indoor unit.

13.1.2 Compressor Frequency Control

13.1.2.1 NLOAD setting

The NLOAD setting is done by the indoor unit controller, based on a PI control scheme.

The actual NLOAD to be sent to the outdoor unit controller, is based on the preliminary LOAD calculation, the indoor fan speed, and the power shedding function.

NLOAD limits as a function of indoor fan speed:

Indoor Fan Speed Maximum NLOAD Cooling Maximum NLOAD Heating

Indoor Fan Speed	Maximum NLOAD Cooling	Maximum NLOAD Heating
Low	Max NLOADIF1C	127
Medium	Max NLOADIF2C	127
High	Max NLOADIF3C	127
Turbo	Max NLOADIF4C	127
Auto	Max NLOADIF5C	127

LOAD limits as a function of power shedding:

Mode	Power Shedding OFF	Power Shedding ON
Cooling	No limit	Nominal Cooling
Heating	No limit	Nominal heating

13.1.3 Target Frequency Setting

The compressor target frequency is a function of the NLOAD number sent from the indoor controller and the outdoor air temperature.

Basic Target Frequency Setting:

NLOAD	Target Frequency
127	Maximum frequency
10 < NLOAD < 127	Interpolated value between minimum and maximum frequency
10	Minimum frequency
0	Compressor is stopped

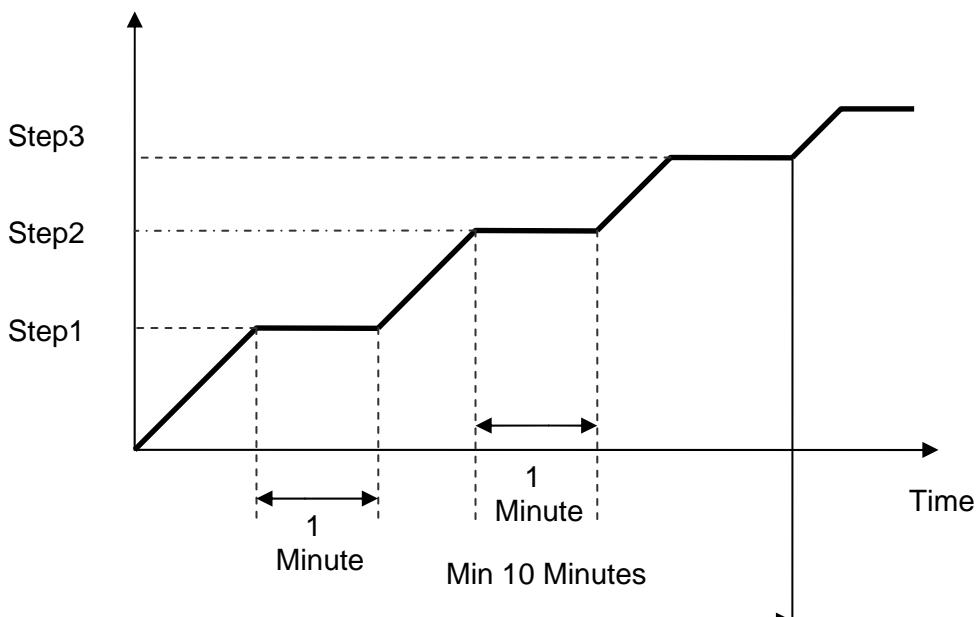
Target frequency limits as a function of outdoor air temperature (OAT):

OAT Range	Cool mode limits	Heat mode limits
OAT < 6	<i>MaxFreqAsOATC</i>	No limit
6 ≤ OAT < 15		<i>MaxFreqAsOAT1H</i>
15 ≤ OAT < 28		<i>MaxFreqAsOAT2H</i>
28 ≤ OAT	No limit	

13.1.4 Frequency Changes Control

Frequency change rate is 1 Hz/sec.

13.1.5 Compressor Starting Control



13.1.6 Minimum On and Off Time

3 minutes.

13.1.7 Indoor Fan Control

10 Indoor fan speeds are determined for each model. 5 speeds for cool/dry/fan modes and 5 speeds for heat mode.

When user sets the indoor fan speed to a fixed speed (Low/ Medium/ High), unit will operate constantly at set speed.

When Auto Fan is selected, indoor unit controller can operate in all speeds. The actual speed is set according to the cool/heat load.

13.1.7.1 Turbo Speed

The Turbo speed is activated during the first 30 minutes of unit operation when auto fan speed is selected and under the following conditions:

- Difference between set point and actual room temperature is bigger than 3 degrees.
- Room temperature > 22 for cooling, or < 25 for heating.

13.1.8 Heating Element Control

Heating element can be started if LOAD > 0.8 * MaximumNLOAD AND Indoor Coil temperature < 45.

The heating element will be stopped when LOAD < 0.5 * MaximumNLOAD OR if Indoor Coil temperature > 50.

13.1.9 Outdoor Fan Control

7 outdoor fan speeds are determined for each model. 3 speeds for cool and dry modes, and 3 speeds for heat mode, and a very low speed.

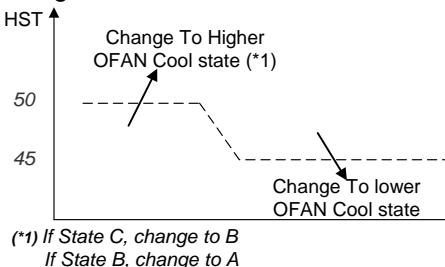
Outdoor fan speed is a function of compressor frequency and outdoor air temperature (OAT).

4 routines for fan control are determined. The control routine selection depends on operation mode, compressor speed, outdoor air temperature (OAT) and heat sink temperature (HST).

Routine	Conditions
A	Heating with OAT < 15°C or Cooling with OAT > 20°C, or Faulty OAT
B	Cooling with 20°C > OAT > 7°C
C	Cooling with 7°C > OAT
D	Heating with OAT > 15°C

Compressor Target Frequency	OFAN Speed			
	Normal cases State A at cool / Heat	State B at cool	State C at cool	OAT>15°C at heat
Freq=0	OFF	OFF	OFF	OFF
10 ≤ Freq < OFLowFreq	Low	Low	Low	Low
OLowFreq ≤ Freq < OMMedFreq	High	Low	Low	Low
OMMedFreq ≤ Freq	High	Low	Low	High

In cooling mode, the extra rule is as the below;



When compressor is switched to OFF and the heat sink temperature is above 55 degrees, the outdoor fan will remain ON in low speed for up to 3 minutes.

13.1.10 EEV (electronic Expansion valve) Control

EEV opening is defined as $EEV = EEV_{OL} + EEV_{CV}$

EEV_{OL} is the initial EEV opening as a function of the compressor frequency, operation mode, unit model and capacity.

EEV_{CV} is a correction value for the EEV opening that is based on the compressor temperature.

During the first 5 minutes of compressor operation $EEV_{CV} = 0$.

Once the first 5 minutes are over, the correction value is calculated as follow: $EEV_{CV}(n) = EEV_{CV}(n-1) + EEV_{CTT}$

EEV_{CTT} is the correction based on the compressor temperature. A target compressor temperature is set depending on frequency and outdoor air temperature, and the actual compressor temperature is compared to the target temperature to set the required correction to the EEV opening.

13.1.11 Reversing Valve (RV) Control

Reversing valve is on in heat mode.

Switching of RV state is done only after compressor is off for over 3 minutes.

13.1.12 ionizer Control

Ionizer is on when unit is on AND indoor fan is on AND Ionizer power switch (on Ionizer) is on.

13.2 Fan Mode

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the difference between actual room temperature and user set point temperature.

13.3 Cool Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

13.4 Heat Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

13.4.1 Temperature Compensation

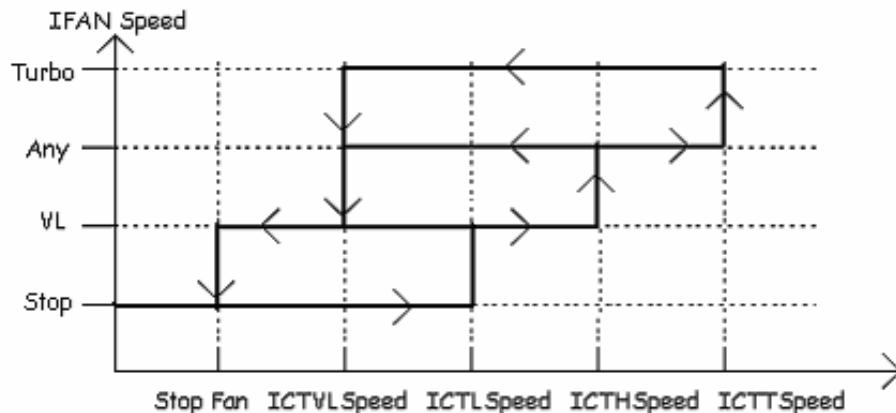
In wall mounted, ducted, and cassette models, 3 degrees are reduced from room temperature reading (except when in I-Feel mode), to compensate for temperature difference between high and low areas in the heated room, and for coil heat radiation on room thermistor.

The temperature compensation can be enabled/disabled by shortening of **J2** on the indoor unit Controller.

Model	J2 Shorted	J2 Opened
Wall mounted	Compensation Disabled	Compensation Enabled
Cassette	Compensation Enabled	Compensation Disabled
Ducted	Compensation Enabled	Compensation Disabled
Floor/Ceiling	Compensation Disabled	Compensation Enabled

13.4.2 Indoor Fan Control in Heat Mode

Indoor fan speed depends on the indoor coil temperature:



13.5 Auto Cool/Heat Mode

When in auto cool heat mode unit will automatically select between cool and heat mode according to the difference between actual room temperature and user set point temperature (ΔT).

Unit will switch from cool to heat when compressor is off for 3 minutes, and $\Delta T < -3$.

Unit will switch from heat to cool when compressor is off for 5 minutes, and $\Delta T < -3$.

13.6 Dry Mode

As long as room temperature is higher then the set point, indoor fan will work in low speed and compressor will work between 0 and *MaxNLOAD/F1C* Hz.

When the room temperature is lower than the set point, compressor will be switched OFF and indoor fan will cycle 3 minutes OFF, 1 minute ON.

13.7 Protections

There are 5 protection codes.

Normal (Norm) – unit operate normally.

Stop Rise (SR) – compressor frequency can not be raised but does not have to be decreased.

HzDown1 (D1) – Compressor frequency is reduced by 2 to 5 Hz per minute.

HzDown2 (D2) – Compressor frequency is reduced by 5 to 10 Hz per minute.

Stop Compressor (SC) – Compressor is stopped.

13.7.1 Indoor Coil Defrost Protection

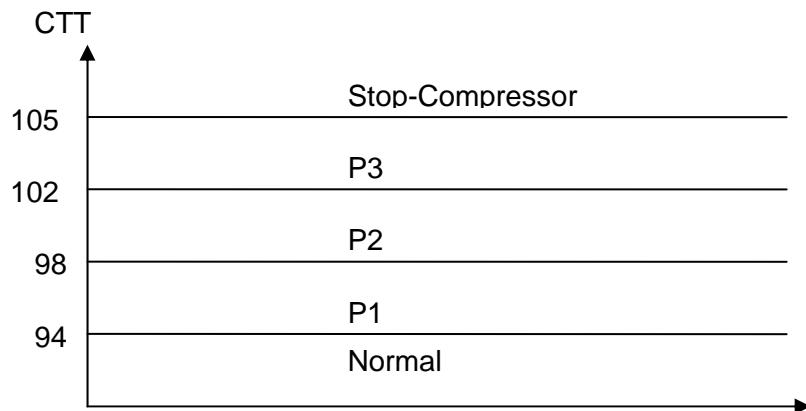
ICT	ICT Trend				
	Fast Increasing	Increasing	No change	Decreasing	Fast Decreasing
ICT < -2	SC	SC	SC	SC	SC
-2 ≤ ICT < 0	D1	D1	D2	D2	D2
0 ≤ ICT < 2	SR	SR	D1	D2	D2
2 ≤ ICT < 4	SR	SR	SR	D1	D2
4 ≤ ICT < 6	Norm	Norm	SR	SR	D1
6 ≤ ICT < 8	Norm	Norm	Norm	SR	SR
8 ≤ ICT	Normal				

13.7.2 Indoor Coil over Heating Protection

ICT	ICT Trend				
	Fast Decreasing	Decreasing	No Change	Increasing	Fast Increasing
ICT > 55	SC	SC	SC	SC	SC
53 < ICT ≤ 55	D1	D1	D2	D2	D2
49 < ICT ≤ 53	SR	SR	D1	D2	D2
47 < ICT ≤ 49	SR	SR	SR	D1	D2
45 < ICT ≤ 47	Norm	Norm	SR	SR	D1
43 < ICT ≤ 45	Norm	Norm	Norm	SR	SR
ICT ≤ 43	Normal				

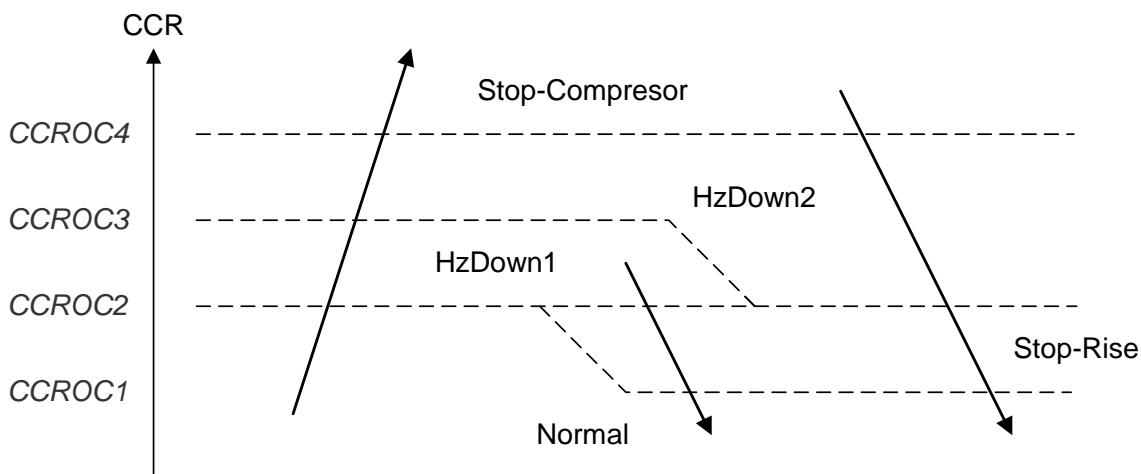
13.7.3 Compressor Overheating Protection

Compressor temperature can be in one of 5 control zones (4 in protection, and 1 normal), according to the following chart.



Control Status	Compressor Temperature Increases	Else
P1	Norm	SR
P2	D1	SR
P3	D2	D1
Stop Compressor	SC	

13.7.4 Compressor over Current Protection



13.7.5 Heat Sink Over Heating Protection (NA for DCI 25 and 35)

HST	HST Trend		
	Decreasing	No Change	Increasing
HST > 90	SC	SC	SC
85 < HST ≤ 90	D1	D2	D2
82 < HST ≤ 85	SR	D1	D2
80 < HST ≤ 82	SR	SR	D1
78 < HST ≤ 80	Norm	Norm	SR
HST ≤ 78	Normal		

13.7.6 Outdoor Coil Deicing Protection

13.7.6.1 Deicing Starting Conditions

Deicing operation will start when either one of the following conditions exist:

- Case 1: OCT < OAT – 8 AND TLD > DI
- Case 2: OCT < OAT – 12 AND TLD > 30 minutes.
- Case 3: OCT is Invalid AND TLD > DI
- Case 4: Unit is just switched to STBY AND OCT < OAT – 8
- Case 5: NLOAD = 0 AND OCT < OAT – 8
- Case 6: OCT < 19 AND TLD > 60 minutes.

OCT – Outdoor Coil Temperature

OAT – Outdoor Air Temperature

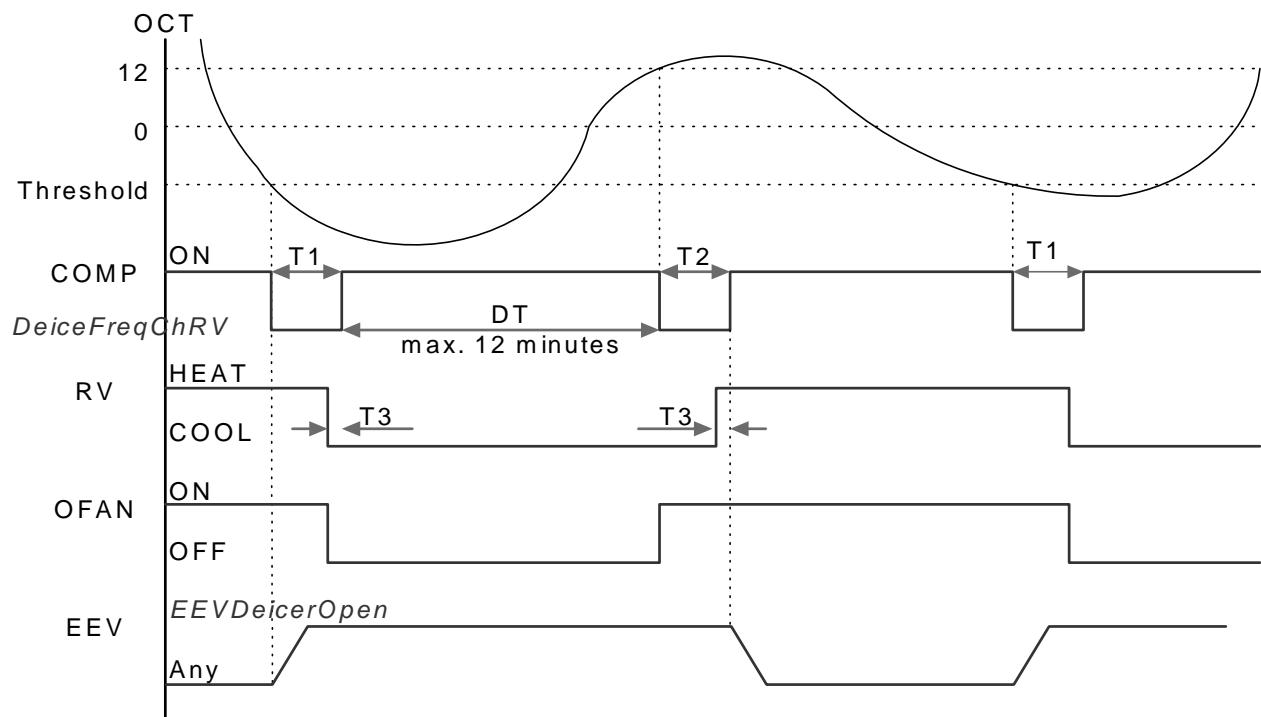
TLD – Time from Last Deicing

DI – Deicing Interval (Time Interval Between Two Deicing)

Deicing interval time when compressor is first started in heat mode, is 10 minutes if OCT < -2, and is 40 minutes in other cases.

Deicing interval time is changed (increased/ decreased in 10 minutes steps) as a function of deicing time. If deicing time is shorter then former deicing time, the deicing interval time will be increased. If deicing time is longer then former deicing time, the deicing interval time will be decreased.

13.7.6.2 Deicing Protection Procedure



T1 = 60 seconds, T2 = 36 seconds, T3 = 6 seconds

13.8 Indoor Unit from Dry Contact

Indoor unit Dry contact has two alternative functions that are selected by J9.

	Function	Contact=open	Contact=short
J9=open	Presence Detector Connection	No limit	Force to STBY
J9=short	Power Shedding Function	No limit	Limit NLOAD

13.9 Operating the Unit from the Mode Button

Forced operation allows to start, stop and operate in Cooling or Heating, in pre-set temperature according to the following table:

Forced operation Mode	Pre-set Temperature
Cooling	20°C
Heating	28°C

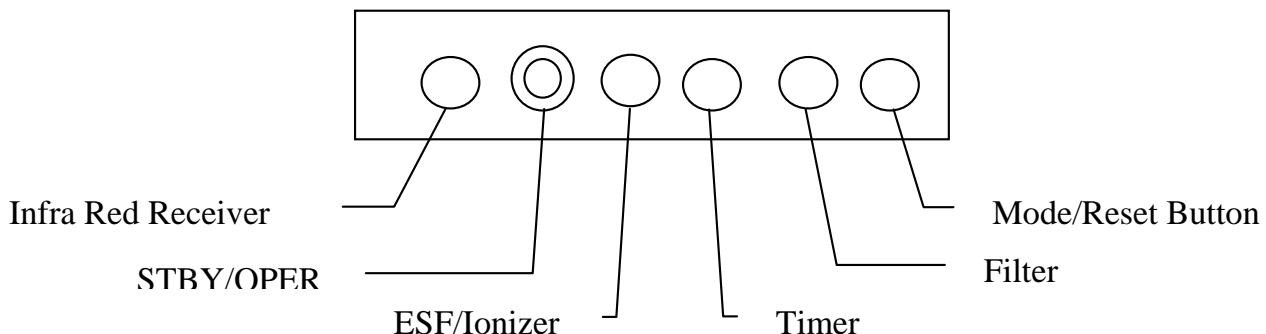
13.10 On Unit Controls and Indicators

13.10.1 Indoor Unit controller Controls and Indicators

STAND BY INDICATOR	<ol style="list-style-type: none"> 1. Lights up when the Air Conditioner is connected to power and the mode is STBY. 2. Blinks for 3 times at 600 msec each cycle, when the system is switched to Heat Mode by using the Mode/Reset Switch on the unit (the operation indicator will be off during this blinking time).
OPERATION INDICATOR	<ol style="list-style-type: none"> 1. Lights up during operation mode (except for item in STBY indicator). 2. Blinks for 600 msec. cycle, to announce that a R/C infrared signal has been received and stored. 3. Blinks continuously during protections (according to the relevant spec section). 4. Blinks for 3 times at 600 msec each cycle when the system is switched to Cool Mode by using the Mode/Reset Switch on the unit
TIMER INDICATOR	Lights up during Timer and Sleep operation.
FILTER INDICATOR	Lights up when Air Filter needs to be cleaned.
Mode/Reset Button	<p>As long as the filter Led is off, the Mode/Reset button functions as Mode switch. Once filter Led is on, the Mode/Reset button functions as Reset switch.</p> <p><u>Mode Function:</u></p> <p>Every short pressing , the next operation mode is selected, in this order: SB → Cool Mode → Heat Mode → SB → ... In long pressing system enters diagnostic mode (refer to diagnostic mode Sect.)</p> <p><u>Reset Function:</u></p> <p>For short pressing:</p> <p>When Filter LED is on, it turns off the filter indicator.</p>
ESF	Lights up us long as the ESF as on

13.10.2 Indoor Unit controller Controls and Indicators

The following is schematic drawing for the display:



13.10.3 Outdoor Unit Controller Indicators

Unit has three LED's. SB LED, STATUS LED, FAULT LED.

SB LED is ON when power is ON (230 VAC),

STATUS LED is ON when COMP is ON, and Blinks according to diagnostics mode definitions when either fault or protection occurs.

FAULT LED Blinks according to diagnostics mode definitions when either fault or protection occurs.

13.11 Jumper Settings

13.11.1 Indoor Unit Controller

0 = Open Jumper (disconnect jumper).

1 = Close Jumper (connect jumper).

Self test Jumper - J1

OPERATION	J1
SELF TEST	1
NORMAL	0

Compensation jumper - J2

Model	J2 (Default)	Compensation
HAD018/022	1	Activated

Family selection Jumper - J3, J4 ,J5, J6 and J11

Family	J11	J6	J5	J4	J3
HAD018/022	0	1	0	0	0

Model selection Jumper - J7

Controller => HAD018/022

Model	J7
HAD018	0
HAD022	1

Jumper - J9

OPERATION	J9
Presence Detector	0
Power Shedding	1

Jumper - J10

OPERATION	J10
With Ionizer	0
Without Ionizer	1

Jumper - J14

OPERATION	J14
LEX Display	0
HAD Display	1

13.11.2 Outdoor Unit ControllerJP9 Jumper Layout

Reserved (PIN 9)	ODU3 (PIN 7)	ODU2 (PIN 5)	ODU1 (PIN 3)	ODU0 (PIN 1)
GND (PIN 10)	GND (PIN 8)	GND (PIN 6)	GND (PIN 4)	GND (PIN 2)

ODU Model Selection

ODU3	ODU2	ODU1	ODU0	ODU Model
OFF	OFF	OFF	OFF	Reserved
OFF	OFF	OFF	ON (PIN1 & PIN2)	A (Single DCI GC 9)
OFF	OFF	ON (PIN3 & PIN4)	OFF	B (Single DCI GC 12)
OFF	OFF	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	C (Single DCI GC 18)
OFF	ON (PIN5 & PIN6)	OFF	OFF	D (Single DCI GC 21)
OFF	ON (PIN5 & PIN6)	OFF	ON (PIN1 & PIN2)	E (Duo DCI GC 18)
OFF	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	OFF	F
OFF	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	G
ON (PIN7 & PIN8)	OFF	OFF	OFF	H
ON (PIN7 & PIN8)	OFF	OFF	ON (PIN1 & PIN2)	I
ON (PIN7 & PIN8)	OFF	ON (PIN3 & PIN4)	OFF	J
ON (PIN7 & PIN8)	OFF	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	K
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	OFF	OFF	L
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	OFF	ON (PIN1 & PIN2)	M
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	OFF	N
ON (PIN7 & PIN8)	ON (PIN5 & PIN6)	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	O

13.12 Test Mode**13.12.1 Entering Test Mode**

System can enter Test mode in two ways:

Automatically when the following conditions exists for 30 minutes continuously: Mode = Cool, Set point = 16, Room temperature = 27 ± 1 , Outdoor temperature = 35 ± 1 Or

Mode = Heat, Set point = 30, Room temperature = 20 ± 1 , Outdoor temperature = 7 ± 1 Manually when entering diagnostics with the following settings: Mode = Cool, Set point = 16 Mode = Heat, Set point = 30 System can enter Test mode in two ways:

Automatically when the following conditions exists for 30 minutes continuously: Mode = Cool, Set point = 16, Room temperature = 27 ± 1 , Outdoor temperature = 35 ± 1 Or

Mode = Heat, Set point = 30, Room temperature = 20 ± 1 , Outdoor temperature = 7 ± 1 Manually when entering diagnostics with the following settings: Mode = Cool, Set point = 16 | Mode = Heat, Set point = 30

13.12.2 Unit Operation in Test Mode

In test mode, the unit will operate in fixed settings according to the indoor fan speed setting:

Indoor FAN Speed Setting	Unit Setting
Low	Minimum Capacity Setting
High	Nominal Capacity Setting
Auto	Maximum Capacity Setting

13.13 SW Parameters**13.13.1 Indoor Units SW Parameters**

Model Depended Parameters:

Name	HAD/WNG018	HAD/WNG022
ICTSTSspeed	25	25
ICTVLSpeed	28	28
ICTLSpeed	30	30
ICTHSpeed	32	32
ICTTSpeed	40	40
MaxNLOADIFC	45	50
MaxNLOADIF2C	62	85
MaxNLOADIF3C	120	120
MaxNLOADIF4C	127	127
MaxNLOADIF5C	127	127
NomLoadC	63	85
NomLoadH	76	82
IFVLOWC	700	800
IFLOWC	900	1000
IFMEDC	1050	1100
IFHIGHC	1200	1250
IFTURBOC	1250	1300
IFVLOWH	700	800
IFLOWH	900	950
IFMEDH	1100	1150
IFHIGHH	1250	1250
IFTURBOH	1300	1300

13.13.2 Outdoor Units SW Parameters

Name	GC 18	GC 21
MinFreqC	20	20
MaxFreqC	85	95
MinFreqH	20	26
MaxFreqH	95	94
Step1 Freq	60	60
Step2Freq	70	70
Step3Freq	90	90
MaxFreqAsOATC	64	85
MaxFreqAsOAT1 H	85	80
MaxFreqAsOAT2H	60	60
CCROC1	10	11.4
CCROC2	10.5	11.8
CCROC3	10.8	12.2
CCROC4	11.2	12.6
OFVL	20	20
OFLOWC	60	55
OFMEDC	76	70
OFMAXC	92	79
OFLOWH	60	55
OFMEDH	83	70
OFMAXH	100	79

14. TROUBLESHOOTING

Troubleshooting for GC 18/GC 21 DCI

WARNING!!!

When Power Up – the whole outdoor unit controller, including the wiring, is under HIGH VOLTAGE!!!

Never open the Outdoor unit before turning off the Power!!!

When turned off, the system is still charged (400V)!!!

It takes about 3 Min. to discharge the system.

Touching the controller before discharging may cause an electrical shock!!!

14.1 Single Split System failures and Corrective Actions

No	Symptom	Probable Cause	Corrective Action
1	Power supply indicator (Red LED) does not light up.	No power supply	Check power supply. If power supply is OK, check display and display wiring. if OK, replace controller.
2	Unit does not respond to remote control message	Remote control message not reached the indoor unit	Check remote control batteries, if batteries are OK, check display and display wiring, if OK, replace display PCB. If still not OK replace controller.
3	Unit responds to remote control message but Operate indicator (Green LED) does not light up	Problem with display PCB	Replace display PCB. If still not OK replace controller.
4	Indoor fan does not start (louvers are opened and Green LED does light up)	Unit in heat mode and coil is still not warm.	Change to cool mode and check.
		Problem with PCB or capacitor	Change to high speed and Check power supply to motor is higher than 130VAC (for triack controlled motor) or higher than 220VAC for fixed speed motors, if OK replace capacitor, if not OK replace controller.
5	Indoor fan works when unit is OFF, and indoor fan speed is not changed by remote control command.	PCB problem	Replace controller
6	Compressor does not start	Electronics control problem or protection	Perform diagnostics and follow the actions described.
7	Compressor stops during operation and Green LED remains on	Electronic control or power supply problem	Perform diagnostics and follow the actions described.
8	Compressor is on but outdoor fan does not work	Problem with outdoor electronics or outdoor fan	Check outdoor fan motor according to the procedure below, if not OK replace controller.

No	Symptom	Probable Cause	Corrective Action
9	Unit works in wrong mode (cool instead of heat or heat instead of cool)	Electronics or power connection to RV	Check RV power connections, if OK, check RV operation with direct 230VAC power supply, if OK, replace outdoor controller.
10	All components are operating properly but no cooling or no heating	Refrigerant leak	Check refrigeration system.
11	Compressor is over heated and unit does not generate capacity	EEV problem	Check EEV.
12	Units goes into protections and compressor is stopped with no clear reason	Control problem or refrigeration system problem	Perform diagnostics , and follow the actions described.
13	Compressor motor is generating noise and no suction occurs	Phase order to compressor is wrong	Check compressor phase order.
14	Water leakage from indoor unit	Indoor unit drainage tube is blocked	Check and open drainage tube.
15	Freezing of outdoor unit in heat mode and outdoor unit base is blocked with ice		Connect base heater.
16	Unit operates with wrong fan speeds or wrong frequency	Wrong jumper settings	Perform diagnostics, and check if units is operating by EEPROM parameters.

14.2 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in Test Mode (in Test mode, system operates in fixed settings). The performance curves given in this manual are given for unit performance in test mode when high indoor fan speed is selected.

Entering test mode:

Set unit to Cool/16 degrees/High indoor fan speed, or Heat/30 degrees/High indoor fan speed, and enter diagnostics.

14.3 Judgment by Indoor/Outdoor Unit Diagnostics

Enter diagnostics mode - press for five seconds Mode button in any operation mode. Acknowledgment is by 3 short beeps and lights of COOL and HEAT LED's. Then, every short pressing of Mode button will scroll between Indoor and Outdoor unit diagnostic modes by the acknowledgment of 3 short beeps and lighting of COOL and HEAT LED's.

During the Outdoor unit diagnostics all four Indoor LED's (STBY, Operate, Filter and Timer) are blinking. When Indoor diagnostics is displayed, all four LED's (STBY, Operate, Filter and Timer) are ON.

When system enters diagnostics mode, only one fault code is shown. Order of priority is from the lower to the higher number. Diagnostics is continuously ON as long as power is ON. The current system operation mode will not be changed.

If no fault occurred in the system, no fault code will be displayed during normal operation mode. The last fault code will be displayed even if the system has recovered from that fault. The last fault will be deleted from the EEPROM after the system has exit diagnostics mode.

In diagnostics mode, system fault / status will be indicated by blinking of Heat & Cool LEDs.

The coding method will be as follows:

Heat LED will blink 5 times in 5 seconds, and then will be shut off for the next 5 seconds. Cool LED will blink during the same 5 seconds according to the following Indoor / Outdoor unit tables:

Note: 0 – OFF, 1-ON

14.3.1 Indoor Unit Diagnostics

No	Problem	5	4	3	2	1
1	ICT is disconnected	0	0	0	0	1
2	ICT is shorted	0	0	0	1	0
3	RAT is disconnected	0	0	0	1	1
4	RAT is shorted	0	0	1	0	0
5	Reserved	0	0	1	0	1
7	Undefined IDU Family/mode	0	0	1	1	1
8	No Communication	0	1	0	0	0
9	No Encoder	0	1	0	0	1
10	Reserved	0	1	0	1	0
11	Outdoor Unit Fault	0	1	0	1	1
...	Reserved					
17	Defrost protection	1	0	0	0	1
18	Deicing Protection	1	0	0	1	0
19	Outdoor Unit Protection	1	0	0	1	1
20	Indoor Coil HP Protection	1	0	1	0	0
21	Overflow Protection	1	0	1	0	1
22	Reserved					
24	EEPROM Not Updated	1	1	0	0	0
25	Bad EEPROM	1	1	0	0	1
26	Bad Communication	1	1	0	1	0
27	Using EEPROM data	1	1	0	1	1
28	Model A	1	1	1	0	0
29	Model B	1	1	1	0	1
30	Model C	1	1	1	1	0
31	Model D	1	1	1	1	1

14.3.2 Indoor Unit Diagnostics and Corrective Actions

No.	Fault	Probable Cause	Corrective Action
1	Sensor failures of all types		Check sensor connections or replace sensor
2	Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
3	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
4	No Encoder	Indoor electronics or motor	Check motor wiring, if ok, replace motor, if still not ok, replace Indoor controller.
5	Outdoor Unit Fault	Outdoor controller problem	Switch to Outdoor diagnostics.
6	EEPROM Not Updated	System is using ROM parameters and not EEPROM parameters	No action, unless special parameters are required for unit operation.
7	Bad EEPROM		No action, unless special parameters are required for unit operation.
8	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding
9	Using EEPROM data	No problem. System is using EEPROM parameters	

14.3.3 Outdoor Unit Diagnoses

No	Problem	5	4	3	2	1
1	OCT is disconnected	0	0	0	0	1
2	OCT is shorted	0	0	0	1	0
3	CTT is disconnected	0	0	0	1	1
4	CTT is shorted	0	0	1	0	0
5	HST is disconnected (when enabled)	0	0	1	0	1
6	HST is shorted (when enabled)	0	0	1	1	0
7	OAT is disconnected (when enabled)	0	0	1	1	1
8	OAT is shorted (when enabled)	0	1	0	0	0
9	TSUC is disconnected (when enabled)	0	1	0	0	1
10	TSUC is shorted (when enabled)	0	1	0	1	0
11	IPM Fault	0	1	0	1	1
12	Bad EEPROM	0	1	1	0	0
13	DC under voltage	0	1	1	0	1
14	DC over voltage	0	1	1	1	0
15	AC under voltage	0	1	1	1	1
16	Indoor / Outdoor unit Communication mismatch	1	0	0	0	0
17	No Communication	1	0	0	0	1
18	Reserved	1	0	0	1	0
20	Heat sink Over Heating	1	0	1	0	0
21	Deicing	1	0	1	0	1
22	Compressor Over Heating	1	0	1	1	0
23	Compressor Over Current	1	0	1	1	1
24	No OFAN Feedback	1	1	0	0	0
25	OFAN locked	1	1	0	0	1
26	Compressor Lock	1	1	0	1	0
27	Bad Communication	1	1	0	1	1

14.3.4 Outdoor Unit Diagnostics and Corrective Actions

No	Fault	Probable Cause	Corrective Action
1	Sensors failures of all types		Check sensors connections or replace sensors.
2	IPM Fault	Electronics HW problem	Check all wiring and jumper settings, if OK, replace electronics.
3	Bad EEPROM		No action, unless special parameters are required for unit operation.
4	DC under/over Voltage	Electronics HW problem	Check outdoor unit power supply voltage
5	AC under Voltage		Check outdoor unit power supply voltage
6	Indoor / Outdoor unit Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
7	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
8	Compressor Lock		Switch unit to STBY and restart
9	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding

14.4 Judgment by MegaTool

MegaTool is a special tool to monitor the system states.

Using MegaTool requires:

- A computer with RS232C port.
- A connection wire for MegaTool.
- A special MegaTool software.

Use MegaTool according to following procedure:

- Setup MegaTool software: copy the software to the computer.
- Connect RS232C port in computer with MegaTool port in Indoor/Outdoor unit controller by the connection wire.
- Run the software and choose the COM port, you can monitor the A/C system state

In monitor tab

14.5 Simple procedures for checking the Main Parts

14.5.1 Checking Mains Voltage.

Confirm that the Mains voltage is between 198 and 264 VAC. If Mains voltage is out of this range, abnormal operation of the system is expected. If in range check the Power (Circuit) Breaker and look for broken or loosed cable lugs or wiring mistake(s).

14.5.2 Checking Power Input.

If Indoor unit power LED is unlighted, power down the system and check the fuse of the Indoor unit. If the fuse is OK replace the Indoor unit controller. If the fuse has blown, replace the fuse and power up again.

Checking Power Input procedure for the Outdoor unit is the same as with the Indoor unit.

14.5.3 Checking the Outdoor Fan Motor.

Enter Test Mode (where the OFAN speed is high)

Check the voltage between lead wires according to the normal value as following:

- Between red wire and black wire: 310VDC +/- 20V
- Between orange wire and black wire: 15VDC +/- 1V
- Between yellow wire and black wire: 2-6VDC

14.5.4 Checking the Compressor.

The compressor is brushless permanence magnetic DC motor. Three coil resistance is same. Check the resistance between three poles. The normal value should be below 0.5 ohm (TBD).

14.5.5 Checking the Reverse Valve (RV).

Running in heating mode, check the voltage between two pins of reverse valve connector, normal voltage is 220VAC.

14.5.6 Checking the electrical expansion valve (EEV).

The EEV has two parts, drive part and valve. The drive part is a step motor; it is ringed on the valve. Check the drive voltage (12VDC). When Outdoor unit is power on, EEV shall run and have click and vibration.

14.6 Precaution, Advise and Notice Items

14.6.1 High voltage in Outdoor unit controller.

Whole controller, including the wires that are connected to the Outdoor unit controller may have the potential hazard voltage when power is on. Touching the Outdoor unit controller may cause an electrical shock.

Advise: Don't touch the naked lead wire and don't insert finger, conductor or anything else into the controller when power is on.

14.6.2 Charged Capacitors

Three large-capacity electrolytic capacitors are used in the Outdoor unit controller. Therefore, charging voltage (380VDC) remains after power down. Discharging takes about four minutes after power is off. Touching the Outdoor unit controller before discharging may cause an electrical shock.

14.6.3 Additional advises

- When disassemble the controller or the front panel, turn off the power supply.
- When connecting or disconnecting the connectors on the PCB, hold the whole housing, don't pull the wire.
- There are sharp fringes and sting on shell. Use gloves when disassemble the A/C units.

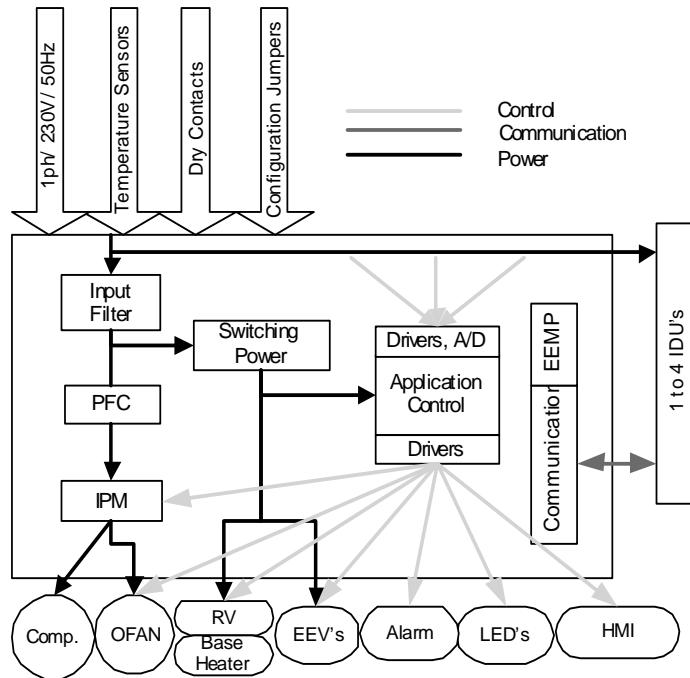
15. CONTROL SYSTEM [HAD024]

15.1 Abbreviations

Abbreviation	Definition
A/C	Air Condition
BMS	Building Management System
PWR	System Power
CTT	Compressor Top Temperature sensor
DCI	DC Inverter
EEV	Electronic Expansion Valve
HE	Heating Element
HMI	Human Machine Interface
HST	Heat Sink Temperature sensor
Hz	Hertz (1/sec) - electrical frequency
ICT	Indoor Coil Temperature (RT2) sensor
IDU	Indoor Unit
MCU	Micro Controller Unit
OAT	Outdoor Air Temperature sensor
OCT	ODU Coil Temperature sensor
ODU	Outdoor Unit
OFAN	Outdoor Fan
PFC	Power Factor Corrector
RAC	Residential A/C
RC	Reverse Cycle (Heat Pump)
RGT	Return Gas Temperature sensor
RPS	Rounds per second (mechanical speed)
RV	Reverse Valve
SB,STBY	Stand By
OMT	Outdoor Middle Temperature
S/W	Software
TBD	To Be Defined
TMR	Timer

15.2 Product Overview

15.2.1 Block Diagram



15.2.2 Compressor

DC brush less and sensor less 2.5/3 horsepower motor inverter driven compressor.

15.2.3 Outdoor Fan

DC brush less motor.

15.2.4 RV

Reverse Valve set the direction of refrigerant flow in the system, thus setting the operation mode for cooling or heating.

When the solenoid is powered, system will work in heat mode.

15.2.5 EEV's

Expansion valve operated by step motor which controls the size of the orifice.

15.2.6 HMI (Optional for single)

Three "7-Segments" + four Push buttons

15.2.7 Dry Contacts

Dry contacts are used to interface the system with an external building management system (BMS).

- **Night** input. Switches the system to night mode when closed.

During night mode, the outdoor unit speed will be reduced in order to reduce the system noise level.

- **SB** input. System will be turned to Stand-by when the contact is closed.
- **Power Shedding** input. Limits the maximum power consumption when closed.
- **Forced Mode** input. Used to force the operation mode of the system
- **Alarm** output indicates a failure at the system.

Alarm output will be activated when there are the following ODU Faults/Protections 1 to 6, 8 to 22, 24, 25, 27 and 28.

Alarm output will be OFF when the Fault/Protection is cleared.

15.2.8 Temperature Sensors

- ◆ **CTT** - Compressor Top Temperature
- ◆ **OAT** - Outdoor Air Temperature
- ◆ **OMT** - Outdoor Middle Temperature
- ◆ **OCT** - Outdoor Coil (heat exchanger) Temperature
- ◆ **HST** - Heat Sink Temperature

15.2.9 Base Heater

Heating element designed to melt any ice that is accumulated on the outdoor unit base during low heating operation.

15.3 General Operating Rules**15.3.1 Initialization**

Initialization process is the first operation done each time power is up. The targets of the initialization are:

- Addressing of IDU's
- Identification of connected IDU's
- IDU Matching Check
- EEV's homing (reset position)
- Restoring Parameters from EEPROM/Jumpers/Dipswitches

15.3.1.1 IDU's Initialization Faults Definition and System Response

	Fault	Activity	Fault Display	System response
⌘	Missing IDU	Update new IDU status stored at the EEPROM.	System configuration Changed	
⌘	Change in IDU Family/Capacity Group	Fault will be stored in EEPROM as an inactive failure of the specific IDU	System configuration Changed	
⌘	IDU Code Exceed Limit	Fault will be stored in EEPROM for the specific IDU	System Configuration Problem	System will switch to SB
⌘	Total IDU Code Exceed Limit	ODU fault will be stored in EEPROM	System Configuration Problem	System will switch to SB

15.3.1.2 WNG72/80 Definition

Indoor Model	Family	Model	IDU Code
WNG72	WNG 18	C	3
WNG80	WNG 30	A	3

The models are named by their family and capacity. For example WNG 9 means a wall mounted units with a nominal cooling capacity of 9000 Btu/hr (which is equivalent to 2.5 kW). The nominal capacity of the indoor unit sets its capacity code

15.3.2 Communication with Indoor Units

15.3.2.1 Communication Failures Definition

Two types of communication failures are diagnosed. The communication failures are checked separately for IDU channel.

15.3.2.1.1 ‘Bad Communication’ fault

The system keeps a balance of a good/bad communication packet ratio for communication channel. When the ratio getting high , system enters ‘Bad Communication’ fault.

15.3.2.1.2 ‘No Communication’ fault

If no legal transmission or no message received for 30 seconds, system enters ‘No Communication’ fault.

When in ‘No Communication’ fault, the system will act as following:

- ♣ If there is no communication, the following will be performed:
 1. The unit changes to SB.
 2. The system will scan all the communication.
 3. Each channel that is identified as ‘no communication’ channel will be referred as STBY unit.
 4. The unit resumes its normal operation with only the operative channels.

15.3.3 Temperature Measurements

15.3.3.1 Thermistor failures definition

Thermistor	Thermistor is Disconnected	Thermistor is Shorted
OCT	Temp < -40 °C	Temp > 75 °C
OAT	Temp < -40 °C	Temp > 75 °C
CTT	Temp < -30 °C	Temp > 130 °C
OMT	Temp < -40 °C	Temp > 75 °C
HST	Temp < -30 °C	Temp > 130 °C

15.3.3.2 System responses for different thermistor failure

Thermistor	Default value	System Reaction
OCT	6°C	
OAT	Cool 35°C Heat 7°C	
CTT	43°C	Forced compressor to OFF after 20 minutes.
OMT	43°C	
HST	43°C	
ICT	43°C	

15.3.4 Flash Memory Programming

In order to upgrade the ODU software the auxiliary port will be used. A special application should be run on a PC to transmit the new firmware.

15.4 Indoor Unit Control

15.4.1 Indoor Fan Control

10 Indoor fan speeds are determined for each model. 5 speeds for each mode cool/dry/fan or heat.

When user sets the indoor fan speed to a fixed speed (Low/ Medium/ High), unit will operate constantly at set speed.

When Auto Fan is selected, indoor unit controller can operate in all speeds. The actual speed is set according to the cool/heat load.

15.4.1.1 Turbo Speed

The Turbo speed is activated during the first 30 minutes of unit operation when auto fan speed is selected and under the following conditions:

Difference between set point and actual room temperature is higher than 3 degrees. Room temperature is higher than 22°C for cooling or less than 25°C for heating.

15.4.2 Cool Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

15.4.3 Heat Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

15.4.3.1 Temperature Compensation

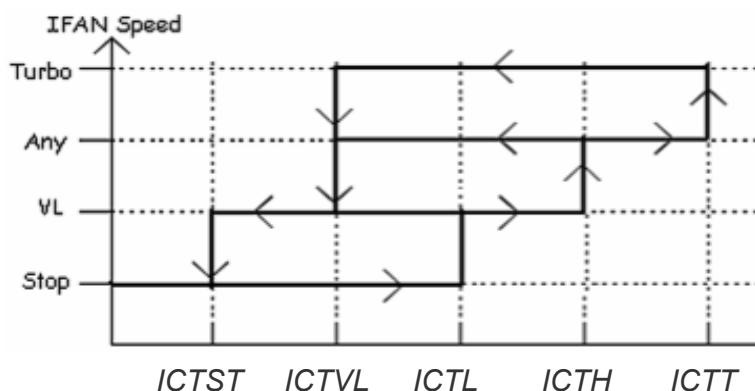
In wall mounted, ducted, and cassette models, 3 degrees are reduced from room temperature reading (except when in I-Feel mode), to compensate for temperature difference between high and low areas in the heated room, and for coil heat radiation on room thermistor.

The temperature compensation can be enabled/disabled by shortening of J2 on the indoor unit controller.

Model	J2 Shorted	J2 Opened
Wall mounted	Compensation Disabled	Compensation Enabled
Cassette	Compensation Enabled	Compensation Disabled
Ducted	Compensation Enabled	Compensation Disabled
Floor/Ceiling	Compensation Disabled	Compensation Enabled

15.4.3.2 Indoor Unit Control in Heat Mode

Indoor fan speed depends on the indoor coil temperature



15.4.4 Auto Cool/Heat Mode

When in auto cool heat mode unit will automatically select between cool and heat mode according to the difference between actual room temperature and user set point temperature (ΔT).

Unit will switch from cool to heat when compressor is off for 3 minutes, and $\Delta T < -3$.

Unit will switch from heat to cool when compressor is off for 5 minutes, and $\Delta T < -3$.

15.4.5 Dry Mode

As long as room temperature is higher then the set point, indoor fan will work in low speed and compressor will work between 0 and *MaxNLOAD/F1C Hz*.

When the room temperature is lower than the set point, compressor will be switched OFF and indoor fan will cycle 3 minutes OFF, 1 minute ON.

15.4.6 Indoor Units Operation when Indoor Unit Mode is Different than Outdoor Unit Mode

- Open louvers according to user selection.
- Indoor fan is forced to OFF.

15.4.7 Heating Element Control

Heating element can be lit on if $LOAD > 0.8 * \text{MaximumNLOAD}$ AND Indoor Coil temperature $< 45^\circ\text{C}$.

The heating element will be off when $LOAD < 0.5 * \text{MaximumNLOAD}$ OR if Indoor Coil temperature $> 50^\circ\text{C}$.

15.4.8 Ionizer Control

WNG Family - Ionizer is on when unit is on AND indoor fan is on AND Ioniser power switch (on Ioniser) is on.

15.4.9 Indoor Unit Dry Contact

Indoor unit Dry contact has two alternative functions that are selected by J8.

Status	Function	Contact = Open	Contact = Short
J8 = Open	Presence Detector Connection	No Limit	Forced to STBY
J8 = Short	Power Shedding Function	No Limit	Limit NLOAD

15.4.10 Operating the Unit from the Mode Button

Forced operation allows to start, stop and operate in Cooling or Heating, in pre-set temperature according to the following table:

Forced operation Mode	Pre-set Temperature
Cooling	20°C
Heating	28°C

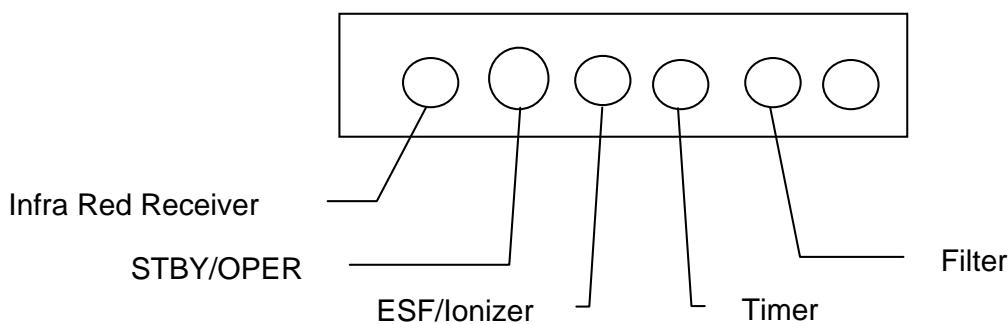
15.4.11 On Unit Controls and Indicators

15.4.11.1 All models Expect for Floor/Ceiling model

STAND BY INDICATOR	<ol style="list-style-type: none"> 1. Lights up when the Air Conditioner is connected to power and the mode is STBY. 2. Blanks for 3 times at 600 msec each cycle, when the system is switched to Heat Mode by using the Mode/Reset Switch on the unit (the operation indicator will be off during this blinking time).
OPERATION INDICATOR	<ol style="list-style-type: none"> 1. Lights up during operation mode (except for item in STBY indicator). 2. Blanks for 600 msec. cycle, to announce that a R/C infrared signal has been received and stored. 3. Blanks continuously during protections (according to the relevant spec section). 4. Blanks for 3 times at 600 msec each cycle when the system is switched to Cool Mode by using the Mode/Reset Switch on the unit
TIMER INDICATOR	Lights up during Timer and Sleep operation.
FILTER INDICATOR	Lights up when Air Filter needs to be cleaned.
Mode/Reset Button	<p>As long as the filter Led is off, the Mode/Reset button functions as Mode switch. Once filter Led is on, the Mode/Reset button functions as Reset switch. Mode Function: Every short pressing , the next operation mode is selected, in this order: SB — Cool Mode — Heat Mode — SB — ... In long pressing system enters diagnostic mode (refer to diagnostic mode Sect.)</p> <p>Reset Function: For short pressing: When Filter LED is on, it turns off the filter indicator.</p>

15.4.11.2 Indoor Unit Controller and Indicators

The following is schematic drawing for the display:



Run Mode

Run mode is the default operation mode of the system. This is the standard operation mode that is active in field application (at customer site).

System can go from run mode to other operation modes through keyboard or serial ports

15.4.12 Mode Setting

Mode defines the ODU operation mode. There are three possible operation modes:

1. STBY - standby mode
2. COOL - the unit operating at cooling cycle
3. HEAT - the unit operating at heat pump cycle

The ODU define the system operation mode according to three methods set by the display key board:

1. First request priority

The first IDU which requests different mode than STBY mode will set the new operation mode. The mode will change once all the units exit the current operation mode.

2. Priority unit

If an IDU is defined as a priority unit, the operational mode will be defined according to that unit request, unless the unit is at STBY mode.

In case priority unit is SB the mode will be set acceding to first request priority.

3. Forced operation mode

If forced mode is enabled than the ODU mode will be forced according to the Forced mode input:

Open → COOL

Short → HEAT

The ODU will go to SB if all the IDU are at SB or at different modes.

4. SB Input

The ODU will change mode between COOL/HEAT and Idle according to the STBY dry contact input as follows:

STBY input	ODU mode
Short	SB
Short -> Open	last mode
Open	according normal mode selection

15.4.13 Compressor Speed Control

15.4.13.1 Compressor Min On/Off time

Compressor minimum OFF time is MinOFFTime minutes except during Deicing protection. Compressor minimum ON time is MinOnTime minutes, minimum ON time is ignored during protections, and when unit is turned to STBY.

15.4.13.2 Compressor Speed calculation

During normal operation (excluding protections), the compressor speed is limited by the minimum speeds:

Min Speed Cool	Max Speed Cool	Min Speed Heat	Max Speed Heat
15	75	15	95

15.4.13.3 Indoor Units NLOAD calculation

The NLOAD setting is done by the indoor unit controller, based on a PI control scheme. The actual NLOAD to be sent to the outdoor unit controller is based on the preliminary LOAD calculation, the indoor fan speed, and the power shedding function.

NLOAD limits as a function of indoor fan speed:

Indoor Fan Speed	Maximum NLOAD Cooling	Maximum NLOAD Heating
Low	Max NLOADIF1C	127
Medium	Max NLOADIF2C	127
High	Max NLOADIF3C	127
Turbo	Max NLOADIF4C	127
Auto	Max NLOADIF5C	127

NLOAD limits as a function of power shedding:

Mode	Power Shedding OFF	Power Shedding ON
Cool	No limit	Nominal Cooling
Heat	No limit	Nominal Heating

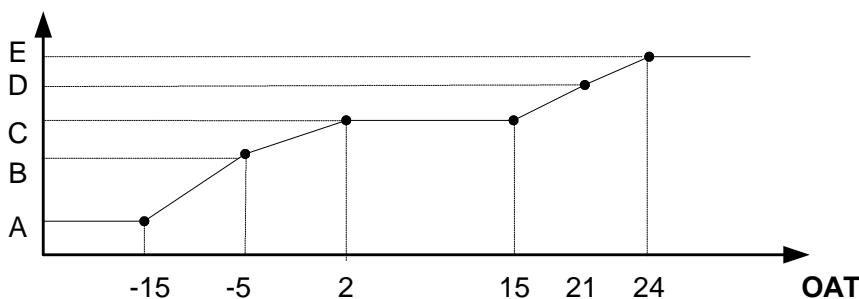
15.4.13.4 Outdoor Unit NLOAD calculation

ODU NLOAD is the weighted average of IDU NLOAD

$$ODU\ NLOAD = \frac{\sum IDU\ NLOAD \cdot Code}{ODUCode}$$

ODU codeH is defined as following:

ODU Code



Point	Single WNG72	Single WNG80			
A	3	3	-	-	-
B	3	3	-	-	-
C	3.8	3.8	-	-	-
D	3.8	3.8	-	-	-
E	3.8	3.8	-	-	-

The code for heat mode is related also to outdoor temperature and so in low heating conditions the compressor speed will be higher.

Compressor speed will be set between the minimum speed and the max speed according to the ODU NLOAD

ODU Codec is defined as following (EEPROM values):

Unit type	ODU codeC
	Cool
Single (Default)	3

15.4.13.5 Speed Step Limitations

15.5.13.5.1 Step 1 and step 2

The compressor speed cannot go below Step1RPS or above Step2RPS during 3 continuous minutes once after the compressor starts up when the ODU unit changes from STBY.

15.4.13.5.2 Step 3 limit

The speed cannot go higher than Step3RPS unless it was operating for more than 1 continuous minute between Step3RPS - 5 and Step3RPS.

15.4.14 EEV Control**15.4.15.1 Operation Range**

The EEV operation range is defined according to the operation mode as following

ODU Mode	Normal operation	IDU inactive	Compressor off
SB	200	0	200
COOL	80 to 350		
HEAT	70 to 400		

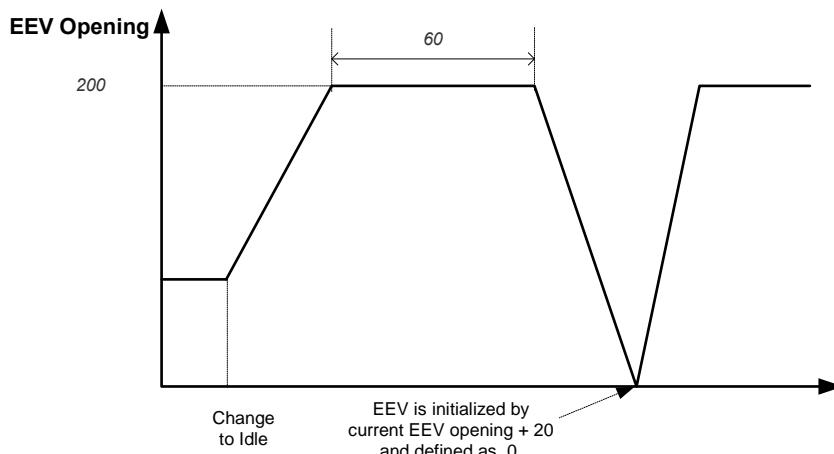
15.4.15.2 Reaching target value rules

For all cases except at EEV initialization procedure, each EEV can move no more than 20 steps at a time.

15.4.15.3 EEV Operation when ODU changes to SB Mode

When the ODU mode is changed to SB, the following is performed immediately

- EEV is set to 200.
- They remain in this position for 60 Sec.
- Then, performs reset (*homming*) procedure.

**15.4.15.4 EEV Opening Determination**

The target EEV value is the sum of open loop value (OL) and a result of the accumulative correction values (CV).

$$EEV = EEV_{OL} + \sum EEV_{CV}$$

15.4.15.5 EEV initial value determination

The EEV initial value (open loop) is determined according to the mode, and the capacity code of the unit.

Basic EEV Open loop				
Mode	WNG72 and 80			
	1	2	3	4
COOL	220	-	-	-
HEAT	210	-	-	-

15.4.15.6 Balance time

During the first 6 minutes after SB the correction is not calculated. After that the correction value is updated every 30 seconds.

15.4.15.7 EEV corrections

The corrections in cool mode will keep the compressor in the proper operation temperature and will balance between the indoor units by controlling CTT-OMT.

15.4.15.8 Accumulative correction value storage

The accumulated EEV correction value will be stored in the memory. Default correction values after power up are zero.

15.4.15 Outdoor Fan Speed Control

15.4.15.1 General Rules

- o OFAN operates between *OFMinRPM* to *OFMaxRPM*.
- o Min time for speed change of OFAN *OFMinTimeReduce* (60 seconds).

There are 4 defined speeds - High, Med, Low, and Very Low.

The actual OFAN speeds in cool mode are defined according to the following table:

Freq	Outdoor air temperature (OAT)											
	-10	-5	0	5	10	15	20	25	30	35	40	46
0	0	0	0	0	0	0	0	0	0	0	0	0
15	80	100	120	130	220	340	460	580	600	730	730	730
25	130	140	160	190	250	380	600	610	670	730	740	750
35	160	180	210	250	330	470	730	730	730	730	780	800
45	205	230	260	320	440	600	730	730	730	730	800	850
55	250	280	310	390	550	730	730	730	730	730	800	850
65	275	315	355	470	640	730	730	730	730	730	800	850
75	300	350	400	550	730	730	730	730	730	730	800	850
85	325	395	445	630	730	730	730	730	730	730	800	850
95	350	440	490	710	730	730	730	730	730	730	800	850

The actual OFAN speeds in heat mode are defined according to the following table:

Freq	Outdoor air temperature (OAT)						
	-15	-7	0	7	14	21	24
0	0	0	0	0	0	0	0
15	850	850	750	750	500	350	300
25	850	850	750	750	520	370	320
35	850	850	750	750	540	390	340
45	850	850	750	750	560	410	360
55	850	850	750	750	580	430	380
65	850	850	750	750	600	450	400
75	850	850	750	750	620	470	420
85	850	850	750	750	640	490	440
95	850	850	750	750	650	500	450

The fan speed is also related to protections and OMT value.

15.4.15.2 Behavior when there is a failure in OFAN

Whenever OFAN fault occurs the compressor will be stopped immediately, except during deicing protection, then the OFAN will be enabled to be started for maximum 5 times. This rule is enabled each time the ODU switches to heat/cool modes.

15.4.15.3 Protection Behavior

- When in total IDU protection level is different than normal, the OFAN will reduce *OFSpdReducePrtC* and *OFSpdReducePrtH* RPM for cool and heat respectively.
- In cool mode the OFAN will operate according to CTT or HST protection level:

Protection level	Action
SR, D1 or D2	OFAN will add 100 RPM to the target speed
Stop-Compressor	continue to operate for maximum 2 minutes at its last speed or until normal level is achieved.

15.4.15.4 OFAN Force On condition

If HST is higher than 70°C or defined as “HST bad”, OFAN will remain ON at the last operating speed for maximum 2 minutes after COMP is OFF.

15.4.15.5 Night mode

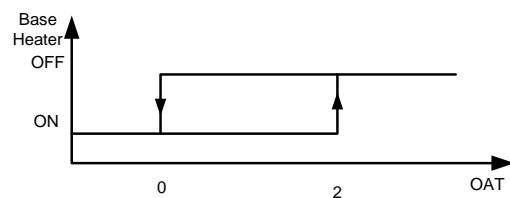
Upon receiving night mode, the OFAN will be limited to max *NightRPM* speed only in Cool. It will be back to its normal operation when receiving the mode is cleared.

15.4.16 RV State Setting

During heat mode (except during Deicing) RV is ON. During cool/SB mode RV is OFF. RV status will be changed only if COMP is OFF for 3 minutes or more.

15.4.17 Base Heater Setting

The base heater will be working only when RV is “ON” according to the following graph:



When OAT is faulty the base heater will be “ON” continuously in HEAT mode.

15.4.18 Thermodynamic Protections**15.5.18.1 Protection level definition**

Five protection levels are defined:

Normal - No protection status is ON.

Stop-Rise (SR) - System is in protection, first level

D1 - System is in protection, second level

D2 - System is in protection third level

Stop-Compressor (SC) - System is in protection fourth level

15.4.18.2 IDU Protection Level

The ODU receives the protection levels from the IDU. The protection levels are weighted according to the following table:

Protection Level	Weight
Normal	0
Stop-Rise	1
D1	2
D2	3
Stop-Compressor	0

15.4.18.3 IDU Protections

15.4.18.3.1 Indoor Cool Defrost Protection

ICT	ICT Trend				
	Fast Increasing	Increasing	No change	Decreasing	Fast Decreasing
ICT < -2	SC	SC	SC	SC	SC
-2 < ICT < 0	D1	D1	D2	D2	D2
0 < ICT < 2	SR	SR	D1	D2	D2
2 < ICT < 4	SR	SR	SR	D1	D2
4 < ICT < 6	Norm	Norm	SR	SR	D1
6 < ICT < 8	Norm	Norm	Norm	SR	SR
8 < ICT	Normal				

15.4.18.3.2 Indoor Coil over Heating Protection

ICT	ICT Trend				
	Fast Decreasing	Decreasing	No Change	Increasing	Fast Increasing
ICT > 55	SC	SC	SC	SC	SC
53 < ICT < 55	D1	D1	D2	D2	D2
49 < ICT < 53	SR	SR	D1	D2	D2
47 < ICT < 49	SR	SR	SR	D1	D2
45 < ICT < 47	Norm	Norm	SR	SR	D1
43 < ICT < 45	Norm	Norm	Norm	SR	SR
ICT < 43	Normal				

15.4.18.4 ODU Protections

There are 3 ODU protections:

- Compressor overheating
- Heat sink overheating
- System over power

Operation logic of all protections is the same. The controlled input (CTT, HST, or PWR) is controlled by changing the protection level using the fuzzy logic algorithm according the input level and the change rate.

There are two sets of POWER values, the selection of the values are set according to the state of the Power-Shed dry contact input. Power-Shed input open -> Power1 Power-Shed input sort -> Power2

The following table summarizes the basic levels of each protection.

Protection level	Compressor Overheat - cool (CTT)	Compressor Overheat - heat (CTT)	Heat Sink (HST)	Power1	Power2
Stop compressor	105	105	83	3600	2900
Down 2	100	100	81	3400	2750
Down 1	98	95	77	3200	2600
Stop rise	95	85	75	3100	2450
Normal	90	80	73	3050	2300

15.4.18.5 Total Protection Level Definition

The total protection level is defined by the higher level of protection received.

15.4.19 Deicing

15.4.19.1 Deicing Starting Conditions

Deicing operation will start when either one of the following conditions exist:

Case 1: OCT < OAT - DST AND TLD > DI

Case 2: OCT < OAT - 12 AND TLD > 30 minutes.

Case 3: OCT is Invalid AND TLD > DI

Case 4: Unit is just switched to STBY AND OCT < OAT - DST

Case 5: NLOAD = 0 AND OCT < OAT - DST

Case 6: OAT is invalid AND OCT < DST AND TLD > DI AND Compressor ON Time > CTMR minutes

OCT - Outdoor Coil Temperature

OAT - Outdoor Air Temperature

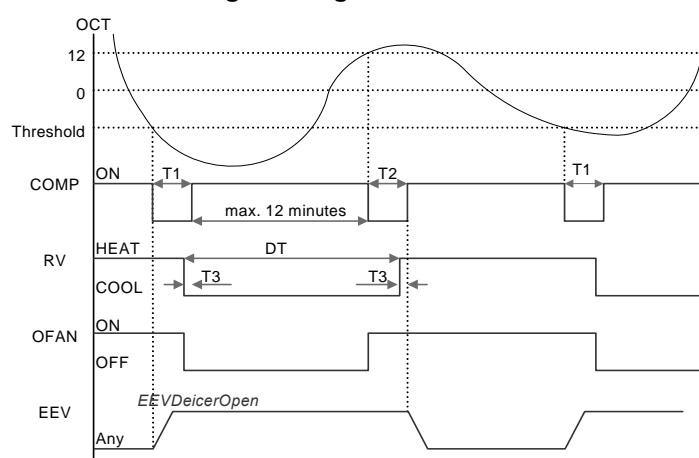
TLD - Time from Last Deicing

DI - Deicing Interval (Time Interval between Two Deicing) DST - Deicing static threshold (Temperature)

Deicing interval time when compressor is first started in heat mode, is 10 minutes if OCT < -2, and is 40 minutes in other cases.

Deicing interval time is changed (increased/ decreased in 10 minutes steps) as a function of deicing time. If deicing time is shorter then former deicing time, the deicing interval time will be increased. If deicing time is longer then former deicing time, the deicing interval time will be decreased.

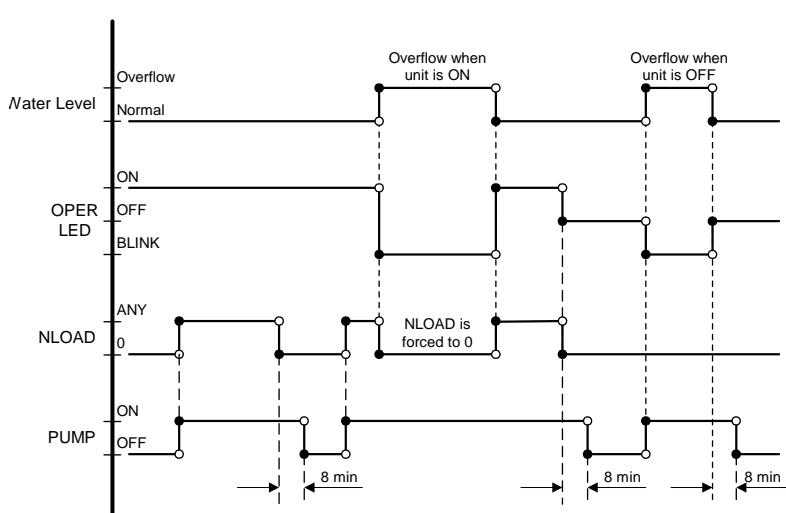
15.4.19.2 Deicing Starting Conditions



T1 = T2 = 36 seconds, T3 = 6 seconds

15.4.19.3 1 Level logic

P2	P3	Level
Don't care	1	Normal
Don't care	0	Overflow



15.5 Technician Test Mode

This test is aimed for the technicians to check the system under a preset compressor and outdoor fan values while the expansion valves will function according to the normal running mode.

15.5.1 Entering technician mode

- o This mode is entered through the outdoor unit using the HMI (refer to user interface section).
- o It can be selected either for cool or heat.
- o Technician test is not possible to enter during deicer.

15.5.2 Technician mode procedure

- All the connected indoor units will enter technician test at high indoor fan speed.
- The outdoor unit will be working normally (according to the run mode control logic) except the following changes:
 - o The dry contacts inputs will be ignored.
 - o Protections will be operative for stop compressor (not to be implemented in the current version).
 - o The compressor and the outdoor fan will be working in target preset values according to the following table:

Technician Test			
Unit	Compressor Speed		OFAN speed
	Cool	Heat	
Trio	60	75	High speed
Quattro	60	75	High speed

15.5.3 Exiting technician mode

Technician mode will be exited either when:

- o Escaping by the HMI (exiting the ttC or ttH menus)
- o 60 minutes are passed from entering

15.6 User Interface

LEDs Indicators - single split only

If any fault exists in the system, it will be shown according to tlf if no fault exists in the system, no fault code will be displayed during normal operation mode, and the status led will be on while the compressor is enable. The following coding method.

Two LEDs display the system diagnostics on real time as follows:

STATUS LED is blinking 5 times in 5 seconds, and shut off for the next 5 seconds.

FAULT LED will blink during the same 5 seconds according to the following table:

No	Problem	5	4	3	2	1
1	OCT bad	0	0	0	0	1
2	CTT bad	0	0	0	1	0
3	HST bad	0	0	0	1	1
4	OAT bad	0	0	1	0	0
5	OMT bad	0	0	1	0	1
6	RGT bad	0	0	1	1	0
7	OFAN/Compressor Feedback Loss	0	0	1	1	1
8	OFAN- IPM fault	0	1	0	0	0
9	OFAN Lock	0	1	0	0	1
10	OFAN- Vospd exceeded	0	1	0	1	0
11	Compressor- IPM Fault	0	1	0	1	1
12	Compressor Lock	0	1	1	0	0
13	Compressor- Vospd exceeded	0	1	1	0	1
14	Compressor- Foldback	0	1	1	1	0
15	DC under voltage	0	1	1	1	1
16	DC over voltage	1	0	0	0	0
17	AC under voltage	1	0	0	0	1
18	No communication A	1	0	0	1	0
19	reserved	1	0	0	1	1
20	reserved	1	0	1	0	0
21	reserved	1	0	1	0	1
22	Compressor- Illegal Speed	1	0	1	1	0
23	System Configuration Changed	1	0	1	1	1
24	System Configuration Problem	1	1	0	0	0
25	Heat sink Over Heating Fault/Protection	1	1	0	0	1
26	Deicing Protection	1	1	0	1	0
27	Compressor Over Heating Protection	1	1	0	1	1
28	System over power Protection	1	1	1	0	0
29	Bad EEPROM	1	1	1	0	1
30	Not Configured	1	1	1	1	0
31:	Bad Communication	1	1	1	1	1

Notes:

1 - ON, 2 - OFF

1. Whenever this table is updated, the installation test procedure, and the alarm output function should be updated.
2. Only one code is shown.
3. Order of priority is 1-32. Diagnostics is continuously ON as long as power is on.
4. Heat Sink Over Heating Protection, Compressor Over Heating Protection, and System Over Power Protection are declared only whenever in 'Stop-Compressor' status.
5. All faults, except the thermistor faults, will remain at least 10 seconds. This rule comes to serve the monitoring utilities, in a case the fault is released quickly it will be still shown under the monitoring utilities.
6. Thermistor faults are reported only when they are enabled.
7. When the outdoor unit is in fault (not protection), an in-fault signal is sent to the indoor. When all the outdoor unit faults are cleared, 'no-fault' signal is sent to the indoor.

15.7 Jumper settings

0 = open (disconnected)

1 = closed (shorted)

15.5.1 Indoor unit controller

Self test Jumper-J1

Operation	J1
SELF-TEST	1
NORMAL	0

Compensation Jumper - J2

Model	J2(Default)	Compensation
HAD24	1	Activated

Family Selection Jumper - J3,J4,J5,J6,J11

Family	J11	J6	J5	J4	J3
HAD24	0	1	0	0	0

Model Selection Jumper - J7

Model	J7
HAD24	0
Reserved	1

Jumper J9

Operation	J9
Presence Detector	0
Power Shedding	1

Jumper J10

Operation	J10
With new function	0
Without new function	1

Jumper J4

Operation	J14
LEX Display	0
HAD Display	1

15.7.2 Outdoor unit controller

OFAN Jumpers

OFAN use parameters	J2	J1
Panasonic- EHD80	0	0
Nidec SIC-71FW-F170-1	0	1
Shinano	1	0
EEPROM	1	1

Compressor Jumpers

Compressor use parameters	J3
TNB220FLBM (ROM)	0
EEPROM	1

15.8 System Parameters

15.8.1 General parameters

Parameter	Default Value
ODUCodeLimit	6

15.8.2 Protection Parameters

Deicer Parameters	
Parameter	Default
DST	8
DSTF	12
DIF (min)	30
CTMR (min)	15
TimeD (min)	1
DIT (min)	10
DTmin (min)	3
Dlmin (min)	30
Dlmax (min)	120
DeicSPChRV	0
EEVDeicerOpen	180
DEICT1 (sec)	50
DEICT2 (sec)	36
DEICT3 (sec)	6
OptimDeicSP	90

15.8.3 Compressor Parameters

Compressor Parameters	Value
MinOFFTime	3
MinOnTime	3
MaxSpeedC	75
MaxSpeedH	95
Step1RPS	40
Step2RPS	60
Step3RPS	75

15.8.4 OFAN parameters

EEV Parameters	Value
OFMinRPM	150
OFMaxRPM	1000
NightRPM	650
OFMinTimeReduce (Sec)	60
OFLowSpC	35
OFMedSpC	50
OFLowSpH	40
OFMedSpH	65

15.8.5 Indoor Units SW Parameters**15.8.5.1 General Parameters for All Models:**

Parameters defining the indoor fan speed as a function of Indoor Coil temperature in heat mode (ICT):

15.8.5.1.1 Parameters for defrost protection;

ICTST Speed	ICT to stop indoor fan	25
ICTVLSpeed	ICT to go down to very low speed	28
ICTLSpeed	ICT to start in very low speed	30
ICTHSpeed	ICT to start in increase speed from very low	32
ICTTSpeed	ICT to enable Turbo fan speed	40
ICTDef1	ICT to go back to normal	8
ICTDef2	ICT to 'stop rise' when ICT decrease	6
ICTDef3	ICT to 'stop rise' when ICT is stable	4
ICTDef4	ICT to 'Hz Down' when ICT decrease	2
ICTDef5	ICT to 'Hz Down' when ICT is stable	0
ICTDef6	ICT to stop compressor	-2

15.8.5.1.2 Parameters for indoor coil over heating protection:

ICTOH1	ICT to go back to normal	45
ICTOH2	ICT to 'stop rise' when ICT increase	48
ICTOH3	ICT to 'stop rise' when ICT is stable	52
ICTOH4	ICT to 'Hz Down' when ICT increase	55
ICTOH5	ICT to 'Hz Down' when ICT is stable	60
ICTOH6	ICT to stop compressor	62

15.8.5.2 Model Depended Parameters:

Parameter name	Wall Mounted Models			Floor/Ceiling Models			Cassette Models			Ducted Models	
	25	35	50	25	35	50	25	35	50	35	50
NLOAD limits as a function of selected indoor fan speed											
MaxNLOADIF1C	40	40	45	40	40	40	40	40	N/A	N/A	N/A
MaxNLOADIF2C	53	53	62	53	53	60	53	56	60	N/A	N/A
MaxNLOADIF3C	120	120	120	120	120	90	120	90	90	N/A	N/A
MaxNLOADIF4C	127	127	127	127	127	90	127	90	90	N/A	N/A
MaxNLOADIF5C	127	127	127	127	127	90	127	90	90	N/A	N/A
Indoor Fan speeds				Fix RPM Motor							
IFVLOWC	700	700	700								
IFLOWC	800	800	900								
IFMEDC	900	950	1050								
IFHIGHC	1050	1100	1200								
IFTURBOC	1150	1200	1250								
IFVLOWH	700	700	700								
IFLOWH	800	850	900								
IFMEDH	950	1000	1100								
IFHIGHH	1100	1150	1250								
IFTURBOH	1200	1250	1300								

16. TROUBLESHOOTING [GC 24]

WARNING!!!

When Power Up – the whole outdoor unit controller, including the wiring, is under HIGH VOLTAGE!!!

Never open the Outdoor unit before turning off the Power!!!

When turned off, the system is still charged (400V)!!!

It takes about 1 Min. to discharge the system.

Touching the controller before discharging may cause an electrical shock!!!

16.1 General System Failures and Corrective Actions

No	Symptom	Probable Cause	Corrective Action
1	Indoor unit power supply indicator (Red LED) does not light up.	No power supply	Check power supply. If OK, check display and display wiring. if OK, replace controller
2	Indoor unit does not respond to remote control message	Remote control message not reached the indoor unit	Check remote control batteries, if OK, check display and display wiring, if OK, replace display PCB. If still not OK replace controller
3	Indoor unit responds to remote control message but Operate indicator (Green LED) does not light up	Problem with display PCB	Replace display PCB. If still not OK replace controller
4	Indoor fan does not start (louvers are opened and Green LED is ON)	Unit in heat mode and coil is still not warm	Change to cool mode
		Outdoor unit is in opposite mode	Change operation mode
		Problem with controller or capacitor	Change to high speed and Check power supply to motor is higher than 130VAC (for triack controlled motor) or higher than 220VAC for fixed speed motors, if OK replace capacitor, if not OK replace controller
5	Indoor fan works when unit is OFF, and indoor fan speed is not changed by remote control command.	Controller problem	Replace controller
6	Water leakage from indoor unit	Indoor unit drainage tube is blocked	Check and open drainage tube

No	Symptom	Probable Cause	Corrective Action
7	Outdoor unit display board and leds are off	No power supply	Check the connections and the wiring on the main terminal - Repair if needed.
		PFC Chock coil	Check the PFC Chock coil
		Burnt fuse	Check 20A fuse on the Filter
8	Compressor operates but no capacity	EEV problem	Check EEV
		Refrigerant leakage	Check refrigeration system
		Indoor coil block	Clean filters and/or remove block
		Outdoor coil block	Remove block and/or avoid air by-pass
9	Compressor is over heated and unit does not generate capacity	EEV problem	Check EEV
		Refrigerant leakage	Check refrigeration system)
		Indoor coil block	Clean filters and/or remove block
		Outdoor coil block	Remove block and/or avoid air by-pass
10	Compressor stops during operation	Electronic control	Check diagnostics
		Refrigerant leakage	Check refrigeration system
11	Unit is not operating	Communication problems	Check diagnostics
12	Compressor does not start	Electronics control problem or protection	
13	Unit works in wrong mode (cool instead of heat or heat instead of cool)	Electronics or RV problem	Check RV
14	All components are operating properly but no cooling or no heating	Refrigerant leak	Check refrigeration system
15	Compressor motor is generating noise and no suction occurs	Phase order to compressor is wrong	Check compressor phase order
16	Freezing of outdoor unit in heat mode and outdoor unit base is blocked with ice		Connect base heater
17	The unit stop suddenly during operation	EMC interference to the A/C unit	Check for EMC problems
18	Indoor unit(s) Indicator(s) leds may flicker		

No	Symptom	Probable Cause	Corrective Action
21	Other home appliances operation is faulty such as noise appears in the television picture, or the picture is distorted or static occurs in the radio sound	EMC interference by the A/C unit	Check for EMC problems
22	All others	Specific problems of indoor or outdoor units	Check diagnostics

16.2 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in technician Mode where the system operates as in fixed settings. The performance curves given in this manual are given for unit performance in Technician mode when high indoor fan speed is selected.

16.3 Diagnostics

16.3.1 Outdoor unit diagnostics

LED's Indicators - Single split only

If any fault exists in the system, it will be shown according to tlf no fault exists in the system, no fault code will be displayed during normal operation mode, and the status led will be on while the compressor is enable.he following coding method.

Two LEDs display the system diagnostics on real time as follows:

STATUS LED is blinking 5 times in 5 seconds, and shut off for the next 5 seconds.

FAULT LED will blink during the same 5 seconds according to the following table:

No	Problem	5	4	3	2	1
1	OCT bad	0	0	0	0	1
2	CTT bad	0	0	0	1	0
3	HST bad	0	0	0	1	1
4	OAT bad	0	0	1	0	0
5	OMT bad	0	0	1	0	1
6	RGT bad	0	0	1	1	0
7	OFAN/Compressor Feedback Loss	0	0	1	1	1
8	OFAN- IPM fault	0	1	0	0	0
9	OFAN Lock	0	1	0	0	1
10	OFAN- Vospd exceeded	0	1	0	1	0
11	Compressor- IPM Fault	0	1	0	1	1
12	Compressor Lock	0	1	1	0	0
13	Compressor- Vospd exceeded	0	1	1	0	1
14	Compressor- Foldback	0	1	1	1	0
15	DC under voltage	0	1	1	1	1
16	DC over voltage	1	0	0	0	0
17	AC under voltage	1	0	0	0	1
18	No communication A	1	0	0	1	0
19	reserved	1	0	0	1	1
20	reserved	1	0	1	0	0
21	reserved	1	0	1	0	1
22	Compressor- Illegal Speed	1	0	1	1	0
23	System Configuration Changed	1	0	1	1	1
24	System Configuration Problem	1	1	0	0	0
25	Heat sink Over Heating Fault/Protection	1	1	0	0	1
26	Deicing Protection	1	1	0	1	0
27	Compressor Over Heating Protection	1	1	0	1	1
28	System over power Protection	1	1	1	0	0
29	Bad EEPROM	1	1	1	0	1
30	Not Configured	1	1	1	1	0
31	Bad Communication	1	1	1	1	1

Notes:**1 - ON,0 - OFF**

1. Whenever this table is updated, the installation test procedure, and the alarm output function should be updated.
2. Only one code is shown.
3. Order of priority is 1-32. Diagnostics is continuously ON as long as power is on.
4. Heat Sink Over Heating Protection, Compressor Over Heating Protection, and System Over Power Protection are declared only whenever in 'Stop-Compressor' status.
5. All faults, except the thermistor faults, will remain at least 10 seconds. This rule comes to serve the monitoring utilities, in a case the fault is released quickly it will be still shown under the monitoring utilities.
6. Thermistor faults are reported only when they are enabled.

When the outdoor unit is in fault (not protection), an in-fault signal is sent to the indoor. When all the outdoor unit faults are cleared, 'no-fault' signal is sent to the indoor.

16.3.2 Outdoor fault corrective actions

No	Fault Name	Probable Cause	Corrective Action
1	OCT bad	Thermistor not connected or damaged	Check Thermistor
2	CTT bad		
3	HST bad		
4	OAT bad		
5	TSUC bad		
6	RGD bad		
7	OFAN/Compressor Feedback Loss	OFAN halls or wires bad. Compressor wire cable bad or IPM bad or compressor bad	Check OFAN motor and compressor
8	OFAN - IPM fault	Over current / Over temperature of OFAN IPM	Check no obstruction to controller air opening Check OFAN motor Check motor type matches motor jumpers in controller
9	OFAN Lock	Fan does not rotate	Check OFAN motor
10	OFAN- Vospd exceeded	Exceeds speed high limit	Check motor type matches motor jumpers in controller Make necessary arrangements in unit installation location to avoid back wind Avoid EMC problems
11	Compressor- IPM Fault	Over current / Over temperature of compressor IPM	Check no obstruction to controller air opening Check Compressor
12	Compressor Lock	Compressor does not rotate	Check Compressor
13	Compressor- Vospd exceeded	Exceeds speed limit	Try again and replace controller if still have the problem
14	Compressor- Foldback	High pressure / Current reduces compressor speed	Check Compressor
15	DC under voltage	DC voltage is lower than limit	Replace controller
16	DC over voltage	DC voltage exceeds its high limit	Check if input voltage higher than limit (270VAC), if not and the problem persists, replace controller. If voltage is high, shut off the power and recommend the customer to fix the power supply
17	AC under voltage	AC input voltage is lower than limit	Check if input voltage lower than limit (170VAC), if not and the problem persists, replace controller. If voltage is low, recommend the customer to fix the power supply

No	Fault Name	Probable Cause	Corrective Action
18	No communication A	No signals in line A	Check communication
19	Compressor- Illegal Speed	Exceeds speed low limit	See # 13
20	System Configuration Changed	Communication lines changed from last operation	No problem just an announcement
21	System Configuration Problem	Miss-match between the IDUs connected to port A,B,C or D, or the total capacity code of IDUs is higher than the ODU maximum capacity code	Change configuration if needed.
22	Heat sink Over Heating Fault/ Protection	Compressor stopped due to heatsink protection	Check that the airflow around the ODU is free and the fan is running free. Check fan motor (0)
23	Deicing Protection	During deicing procedure	No action required
24	Compressor Over Heating Protection	Compressor stopped due to over heat protection	Check if gas is missing in the system
25	System over power Protection	Compressor stopped due to over power protection	No action required
26	Bad EEPROM	EEPROM not operating	Power reset. (Replace Controller just in case you need EEPROM).
27	Not Configured	Cannot start the control	Power reset. Replace Controller if didn't help
28	Bad Communication	Bad communication lines	See # 18-21

16.3.3 Fault Code for Indoor unit

Pressing Mode button for long will activate diagnostic mode by the acknowledgment of 3 short beeps and lighting of COOL and HEAT LED's.

Entering diagnostics in STBY mode allows only viewing of status (fault-display).

In diagnostic mode, system problems / information will be indicated by blinking of Heat & Cool LED's.

The coding method will be as follows:

Heat led will blink 5 times in 5 seconds, and then will be shut off for the next 5 seconds. Cool Led will blink during the same 5 seconds according to the following table

No	Fault Name	5	4	3	2	1
1	RT-1 is disconnected	0	0	0	0	1
2	RT-1 is shorted	0	0	0	1	0
3	RT-2 is disconnected	0	0	0	1	1
4	RT-2 is shorted	0	0	1	0	0
...	Reserved	0	0	1	0	1
7	Communication mismatch	0	0	1	1	1
8	No Communication	0	1	0	0	0
9	No Encoder	0	1	0	0	1
10	Reserved	0	1	0	1	0
11	Outdoor Unit Fault	0	1	0	1	1
...	Reserved					
17	Defrost protection	1	0	0	0	1
18	Deicing Protection	1	0	0	1	0
19	Outdoor Unit Protection	1	0	0	1	1
20	Indoor Coil HP Protection	1	0	1	0	0
21	Overflow Protection	1	0	1	0	1
...	Reserved					
24	EEPROM Not Updated	1	1	0	0	0
25	Bad EEPROM	1	1	0	0	1
26	Bad Communication	1	1	0	1	0
27	Using EEPROM data	1	1	0	1	1
28	Model A	1	1	1	0	0
29	Model B	1	1	1	0	1
30	Model C	1	1	1	1	0
31	Model D	1	1	1	1	1

1 - ON, 0 - OFF

Only one code is shown. Order of priority is lower to the higher number. Diagnostics is continuously ON as long power is on.

16.3.4 Indoor unit diagnostics and corrective actions

No.	Fault	Probable Cause	Corrective Action
1-4	Sensor failures	Sensors not connected or damaged	Check sensor connections or replace sensor
7	Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
8	No Communication	Communication or grounding wiring is not good	Check Indoor to Outdoor wiring and grounding
9	No Encoder	Indoor electronics or motor	Check motor wiring, if ok, replace motor, if still not ok, replace Indoor controller.
11	Outdoor Unit Fault	Outdoor controller problem	Switch to Outdoor diagnostics.
17-21	Protections	Indication	No action
24	EEPROM Not Updated	System is using ROM parameters and not EEPROM parameters	No action, unless special parameters are required for unit operation.
25	Bad EEPROM		No action, unless special parameters are required for unit operation.
26	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding
27	Using EEPROM data	No problem	
28-31	IDU model		

16.4 Procedures for checking Main Parts

16.4.1 Checking Mains Voltage

Confirm that the Mains voltage is between 198 and 264 VAC. If Mains voltage is out of this range, abnormal operation of the system is expected. If in range check the Power (Circuit) Breaker and look for broken or loosed cable lugs or wiring mistake(s).

16.4.2 Checking Main fuse

Check 20A fuse on the Filter Board - If burnt – check the compressor, fan or any other peripheral that can cause a short. In case of a problematic peripheral - replace it.

In case no problematic peripheral, check the resistance on the DC bank (B+ & B- on the Power board), if it is less than 30Ω , replace the controller. Otherwise replace the burnt fuse. In case of frequent burning fuse, replace the controller.

16.4.3 Checking PFC Chock coil

Check PFC chock connection – repair if needed.

Dis-connect the chock from the controller wire extensions, check if the 2 wires of the chock are shorted. If shorted (OK) check between each wire and the metal box. If shorted replace chock, if not (OK), open the controller top cover and check if the wire extensions are connected well and if shorted. If not shorted, replace wires, if shorted (OK) than might be a controller problem – replace controller.

16.4.4 Checking the Outdoor Fan Motor

Check FAN-Power and FAN-Halls connections - Repair if needed.

Rotate the fan slowly by hand. If the fan does not rotate easily, check whether something is obstructing the fan, or if the fan itself is coming into contact with the outer case, preventing it from rotating. Correct if necessary - otherwise, the fan motor bearings have seized. Replace the motor.

If the fan rotates easily, use a current probe ("Clamp") to assure AC current on each phase and it is less than 1A.

In case there is no current, check the resistance between the three poles. Assure the three coil resistances are almost the same.

The normal value should be between 10Ω to 20Ω .

Change to Stand-by or Power OFF and re-start - If the fault is still active - replace controller.

16.4.5 Checking the Compressor

Check Compressor connections - Repair if needed.

Use a current probe ("Clamp") to assure that there is an AC current on each phase – no more than 15A.

In case there is no current, check the resistance between the three poles. Assure the three coil resistances are almost the same (between 0.8Ω to 1.5Ω).

Change to Stand-by or Power OFF and re-start - If the fault is still "Active" - replace controller.

16.4.6 Checking the Reverse Valve (RV)

The RV has two parts, Solonoid and valve.

Solonoid - Running in heating mode, check the voltage between two pins of reverse valve connector, normal voltage is 230VAC. If no power supply to RV, Check RV operation with direct 230VAC power supply, if OK, replace outdoor controller.

Valve - if RV solonoid is OK (as above) but still no heating operation while compressor is On, replace the valve.

16.4.7 Checking the electrical expansion valve (EEV)

The EEV has two parts, drive and valve.

When Outdoor unit is powered on, EEV shall run and have click and vibration.

For assuring the problem is of the EEV parts, perform the installation test and if fails and no other indications in the diagnostics, than the problem is with the EEV (one or more).

Drive - a step motor; ringed on the valve. Check the drive voltage, should be 12VDC.

Valve – if drive is OK (as above) but still the indoor unit perform no conditioning replace the valve (no need to take out the refrigerant, just pump down and shut off the main valves).

16.4.8 Checking the termistors

Check Thermistor connections and wiring - Repair if needed.

Check Thermistor resistance – between 0°C and 40°C should be between $35\text{K}\Omega$ and $5\text{K}\Omega$.

16.4.9 Checking the communication

Change to Stand-by or Power OFF and re-start - If the fault is still "Active" check Indoor to Outdoor. Communication wiring and grounding connections (should be less than 2.0Ω) - Repair if needed.

If IDU failure – replace IDU controller that does not respond.

If ODU failure – replace ODU.

16.4.10 Checking for electromagnetic interference (EMC problems)

16.4.10.1 EMC troubles to the A/C unit

EMC troubles to the A/C unit

Locations most susceptible to noise :

1. Locations near broadcast stations where there are strong electromagnetic waves.
2. Locations near amateur radio (short wave) stations.
3. Locations near electronic sewing machines and arc-welding machines.

Trouble :

Either of the following trouble may occur:

1. The unit may stop suddenly during operation.
2. Indicator lamps may flicker

Correction :

The fundamental concept is to make the system less susceptible to noise (insulate for noise or distance from the noise source):

1. Use shielded wires.
2. Move unit away from the noise source.

16.4.10.2 EMC troubles to near by home applications

Locations most susceptible to noise :

1. A television or radio is located near the A/C and A/C wiring.
2. The antenna cable for a television or radio is located close to the A/C and A/C wiring.
3. Locations where television and radio signals are weak.

Trouble :

1. Noise appears in the television picture, or the picture is distorted.
2. Static occurs in the radio sound.

Correction

1. Select a separate power source.
2. Keep the A/C and A/C wiring at least 1 meter away from wireless devices and antenna cables.
3. Change the wireless device's antenna to a high sensitivity antenna.
4. Change the antenna cable to a BS coaxial cable.
5. Use a noise filter (for the wireless device).
6. Use a signal booster.

16.5 Precaution, Advise and Notice Items

16.5.1 High voltage in Outdoor unit controller

Whole controller, including the wires, connected to the Outdoor unit controller may have the potential hazard voltage when power is on. Touching the Outdoor unit controller may cause an electrical shock.

Advise: Don't touch the naked lead wire and don't insert finger, conductor or anything else into the controller when power is on.

16.5.2 Charged Capacitors

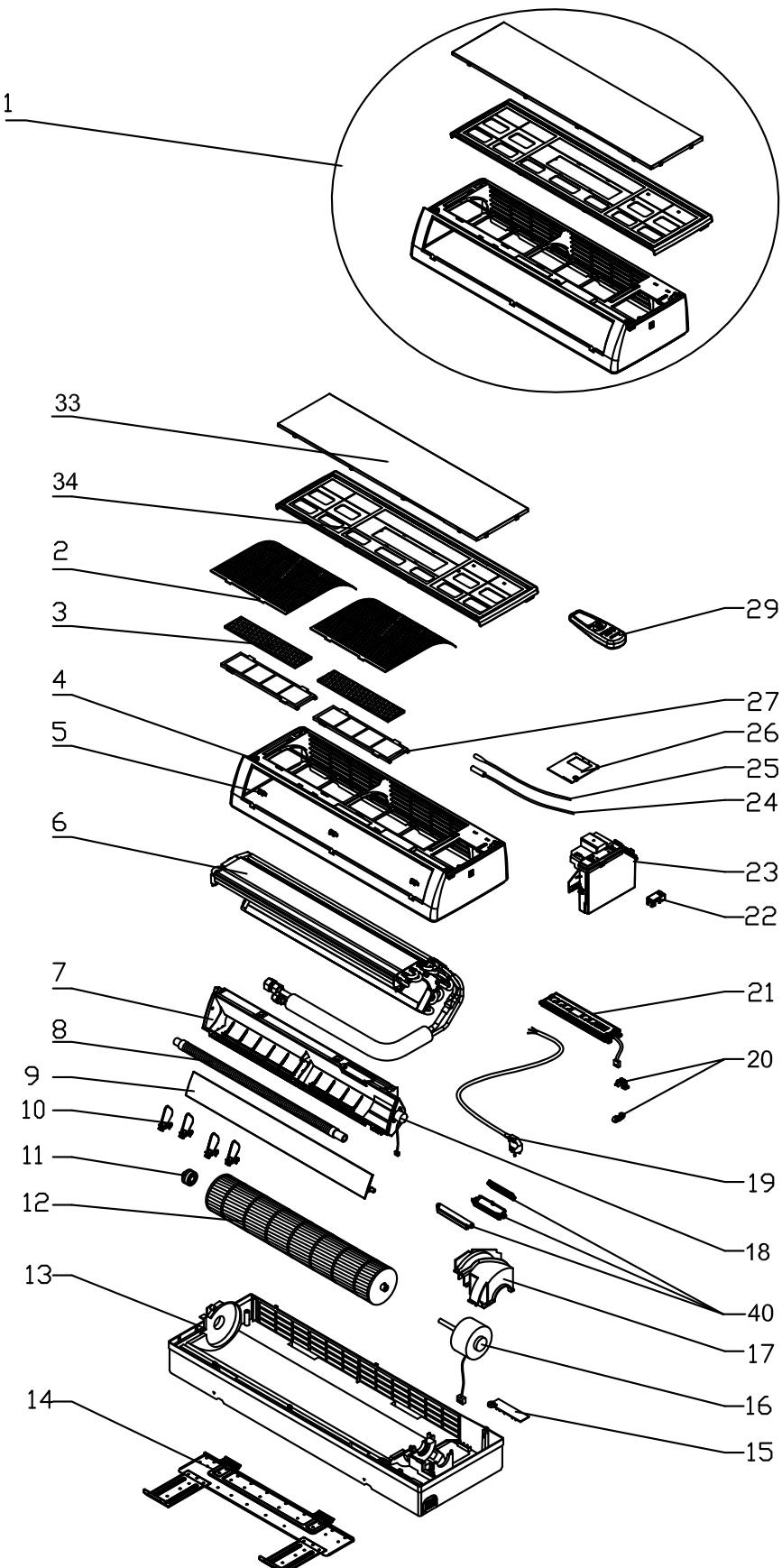
Three large-capacity electrolytic capacitors are used in the Outdoor unit controller. Therefore, charging voltage (380VDC) remains after power down. Discharging takes about one minute after turned off. Touching the Outdoor unit controller before discharging may cause an electrical shock. When open the Outdoor unit controller cover, don't touch the soldering pin by hand or by any conductive material.

Advise:

- Open the Outdoor unit controller cover only after one minute from power off.
- Measure the electrolytic capacitors voltage before farther checking controller.

Additional advises

- When disassemble the controller or the front panel, turn off the power supply.
- When connecting or disconnecting the connectors on the PCB, hold the whole housing, don't pull the wire.
- There are sharp fringes and sting on shell. Use gloves when disassemble the A/C units.

17. EXPLODED VIEWS AND SPARE PARTS LISTS**17.1 Indoor Unit: HAD007 / HAD009 / HAD012**

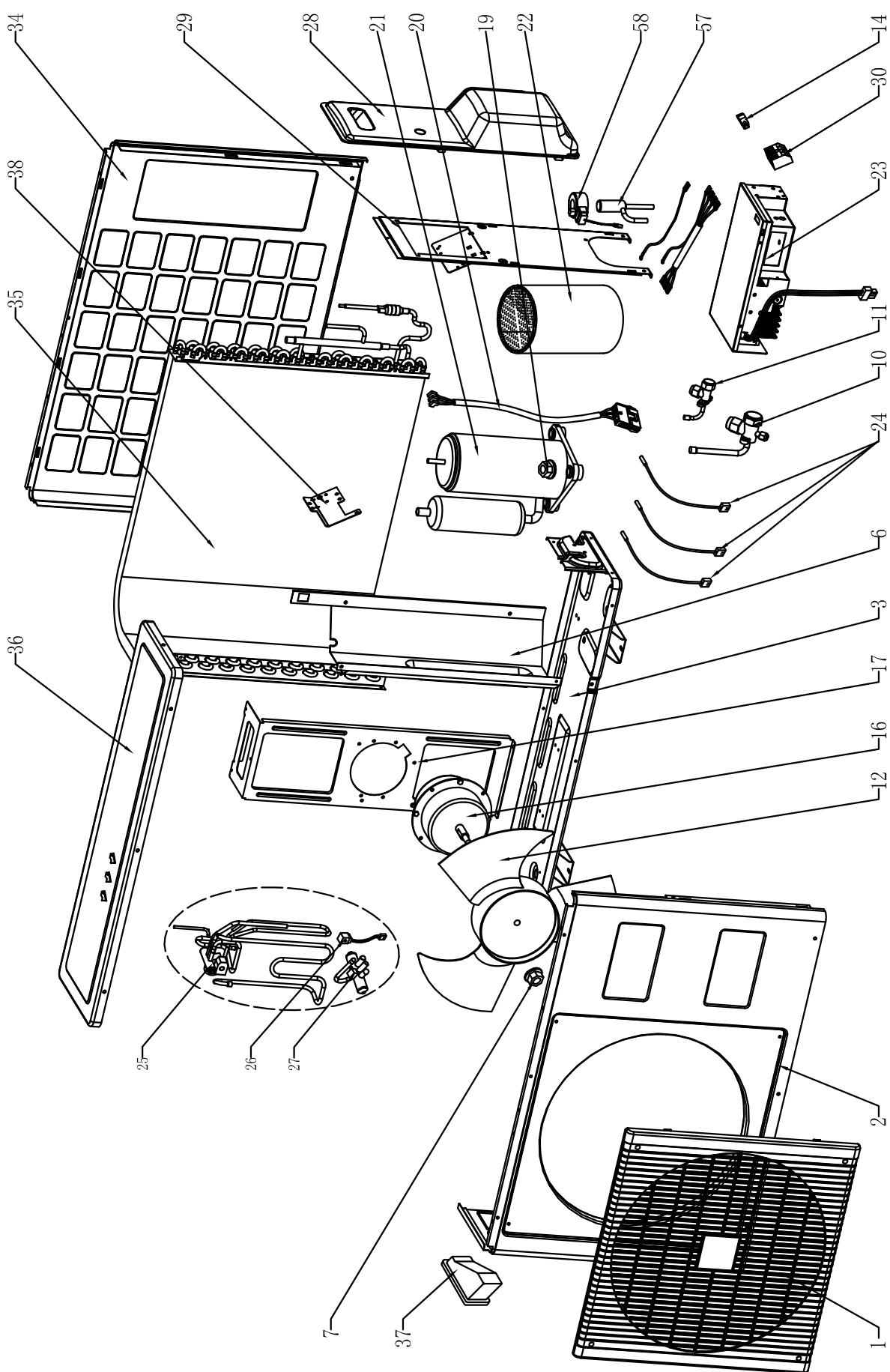
17.2 Intdoor Unit: HAD007 / HAD009

Drawing NO.	Component	Item Description	Quantity
1	465720334	Front frame & Front Plate Assy.Electra	1
1	465720338	Front frame & Front Plate Assy.Airwell	1
1	465720342	Front frame & Front Plate Assy.Johnson	1
1	465720327	Front frame & Front Plate Assy.Electra(Israel)	1
2	453036500	Air Filter	2
3	470500005	Nanometer Photocatalysis Deodorant Filter	1
3	470500008	Biological Sterilization Filter	1
4	465720212	Front Frame Assy./HAD-7/9	1
5	4525987	SCREW COVER	3
6	453070701	Evap. System Assy./DELTA 22,25	1
7	465120015	Air Outlet Frame/HAD-7/9	1
8	465210009	Drain Pipe for Israel /WNG18/24/30	1
9	465120017	Louver/HAD-7/9	1
10	4525992	VER. FLAP A	8
10	4525993	VER. FLAP B	2
11	4523526	BERAING ASSY FAN	1
12	453264200	Impeller Fan	1
13	4526659	REAR PANEL ASSY	1
14	464220008	Mount Bracket./Low Cost ALPHA 9	1
15	4526000	TUBE CLIP	1
16	453088600R	PG Resin motor 12W	1
17	4525998	MOTEOR COVER	1
18	4523507	Step motor	1
19	455013702R	Power Cord Without Plug/3G/1.0/2100	1
20	4525988	CABLE LOCKER	1
21	467300228R	Display / HAD	1
22	465360037	Sensor Holder/HAD-7/9/12	1
23	467300230R	Controller / DCI HAD IDU 25/35	1
24	438082	Thermistor Indoor coil □BLACK□	1
25	4519813	Thermistor room	1
26	465340008	Terminal Cover/ ALPHA7/9 Flat-Type	1
27	4525990	Filter bracket	2
29	467200012R	Remote controller RC-4	1
33	465020125	Flat Panel/HAD-7/9	1
34	465020123	Front panel/HAD-7/9	1
40	465340070	Ionizer Holder/HAD-7/9/12	1
40	467480009	Ionizer/Bi-Polar	1

17.3 Intdoor Unit: HAD012

Drawing NO.	Component	Item Description	Quantity
1	465720335	Front frame & Front Plate Assy.Electra	1
1	465720339	Front frame & Front Plate Assy.Airwell	1
1	465720343	Front frame & Front Plate Assy.Johnson	1
1	465720328	Front frame & Front Plate Assy.Electra(Israel)	1
2	453082900	Filter for DELTA 12	2
3	470500006	Nanometer Photocatalysis Deodorant Filter	1
3	470500009	Biological Sterilization Filter	1
4	465720213	Front Frame Assy./HAD35	1
5	4525987	SCREW COVER	3
6	453058201	Evap. System Assy./DELTA35	1
7	465120016	Air Outlet Frame/HAD35	1
8	465210009	Drain Pipe for Israel /WNG18/24/30	1
9	465120018	Louver/HAD-12	1
10	4525992	VER. FLAP A	9
10	4527510	Vertical Flap B	3
11	4523526	BERAING ASSY FAN	1
12	4527111	Impeller Fan	1
13	4527186	REAR PANEL ASSY	1
14	464220007	Mount Bracket	1
15	4526000	TUBE CLIP	1
16	453088600R	PG Resin motor 12W	1
17	4525998	MOTEOR COVER	1
18	4523507	Step motor	1
19	455013700R	Power Cord Without Plug/3G/1.5/2100	1
20	4525988	CABLE LOCKER	1
21	467300228R	Display / HAD	1
22	465360037	Sensor Holder/HAD-7/9/12	1
23	467300230R	Controller / DCI HAD IDU 25/35	1
24	438082	Thermistor Indoor coil□BLACK□	1
25	4519813	Thermistor room	1
26	465340008	Terminal Cover	1
27	4527508	Filter bracket	2
29	467200012R	Remote controller RC-4	1
33	465020126	Flat Panel/HAD&HAF-12	1
34	465020124	Front panel/HAD&HAF-12	1
40	465340070	Ionizer Holder/HAD-7/9/12	1
40	467480009	Ionizer/Bi-Polar	1

17.4 Outdoor Unit: GC 7 RC / GC 9 RC / GC 12 RC DCI



17.5 Outdoor Unit: GC 7 RC DCI

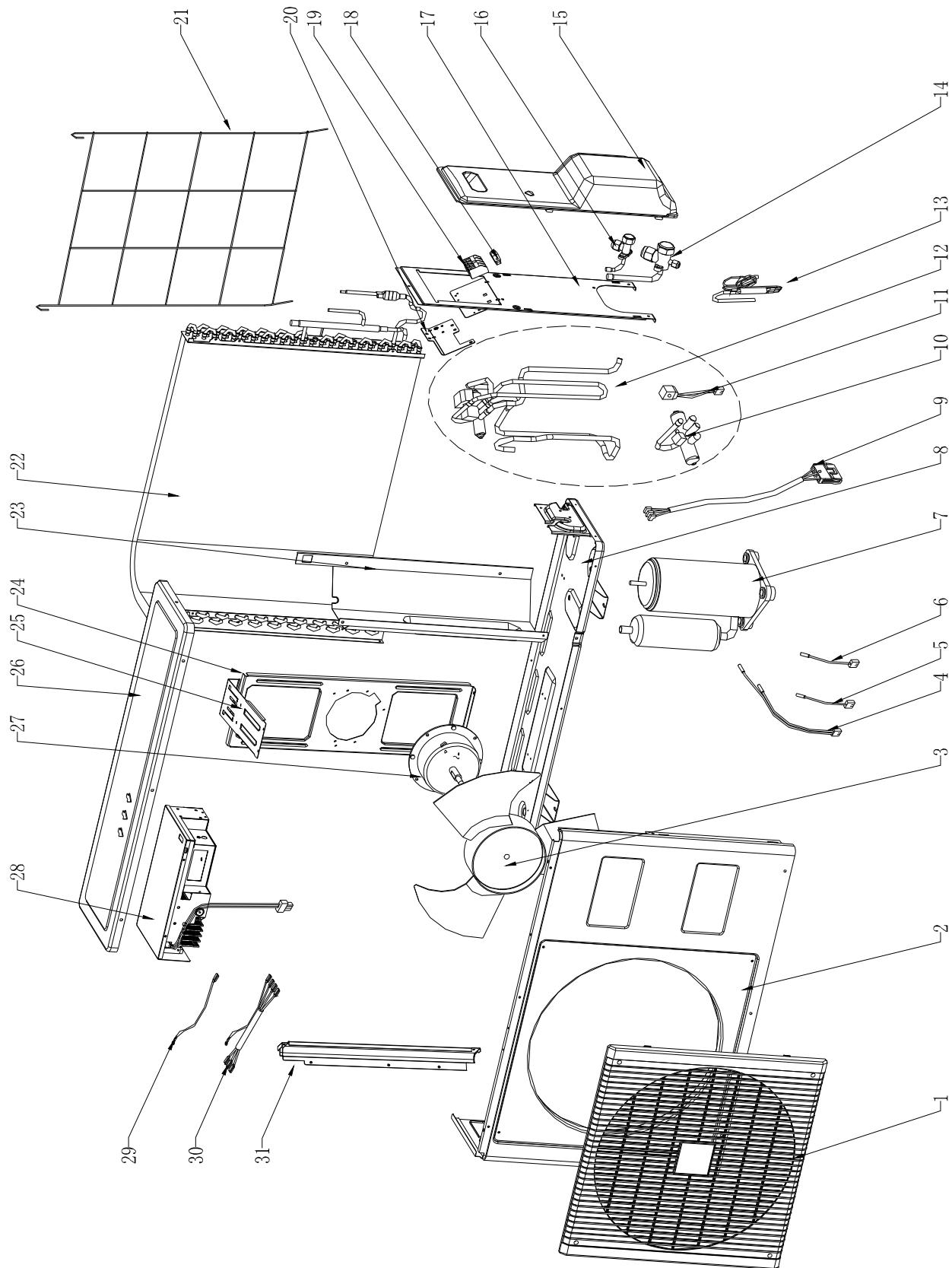
No.	Part No.	Name	Quan.
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	453238900	Sensor/OAT	1
5	4526775	Compressor top thermistor(CTT)	1
6	4526776	Outdoor coil thermistor(OCT)	1
7	453170100	Compressor Assy. MATSUSHIBA 5RS092XDJ01	1
8	453052500	PAINTING BASE ASSY.	1
9	4526221	Compressor wire	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	453058600	4way valve soldering assy FOR DCR 7	1
13	453026600	Electronic expansion valve ZDPF(L)-1.5C-01	1
14	4526216	EEV COIL QA(L)12-MD-02	1
15	453047000	Low pressure stop valve for R410A	1
16	4516857	BIG SIDE COVER	1
17	453046900	High pressure stop valve for R410A	1
18	464630000	Side Plate Painting Assy.	1
19	253046	Clip set PVC	1
20	4519188	4 poles terminal block	1
21	4516156	Rear panel Painting assy	1
22	453230000	Connect Plate	1
23	453048000	Condenser assy. (OD7.94x1row) for DCR 7	1
24	453052700	PATITION	1
25	323156	Motor support assy	1
26	4516158	Cover panel Painting assy	1
27	453031300	Metal motor 20W	1
28	453031000	DC INVERTER CONTROLLER EHK:906-106-00	1
29	452841100	Earth wire	1
30	453129300	Wire UL1007 16AWG/Controller with 250 connector	1

17.6 Outdoor Unit: GC 9 RC DCI

No.	Part No.	Name	Quan.
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	453238900	Sensor/OAT	1
5	4526775	Compressor top thermistor(CTT)	1
6	4526776	Outdoor coil thermistor(OCT)	1
7	453170100	Compressor: Rotary, Panasonic 5RS092XDJ01	1
8	453052500	PAINTING BASE ASSY.	1
9	4526221	Compressor wire	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	453058700	4way valve soldering assy FOR DCR 9	1
13	453026600	Electronic expansion valve ZDPF(L)-1.5C-01	1
14	4526216	EEV COIL QA(L)12-MD-02	1
15	453047000	Low pressure stop valve for R410A	1
16	4516857	BIG SIDE COVER	1
17	453046900	High pressure stop valve for R410A	1
18	464630000	Side Plate Painting Assy.	1
19	253046	Clip set PVC	1
20	4519188	4 poles terminal block	1
21	4516156	Rear panel Painting assy	1
22	453230000	Connect Plate	1
23	453048200	Condenser assy. (OD7x2rows) for DCR 9	1
24	453052700	PATITION	1
25	323156	Motor support assy	1
26	4516158	Cover panel Painting assy	1
27	453031300	Metal motor 20W	1
28	453031000	DC INVERTER CONTROLLER EHK:906-106-00	1
29	452841100	Earth wire	1
30	453129300	Wire UL1007 16AWG/Controller with 250 connector	1

17.7 Outdoor Unit: GC 12 RC DCI

No.	Part No.	Name	Quan.
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	453238900	Sensor/OAT	1
5	4526775	Compressor top thermistor(CTT)	1
6	4526776	Outdoor coil thermistor(OCT)	1
7	4526204	Compressor Assy. Rotary, Panasonic 5RS102XAB01	1
8	453052500	PAINTING BASE ASSY.	1
9	4526221	Compressor wire	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	453058800	4way valve soldering assy FOR DCR 35	1
13	453026600	Electronic expansion valve ZDPF(L)-1.5C-01	1
14	4526216	EEV COIL QA(L)12-MD-02	1
15	453047000	Low pressure stop valve for R410A	1
16	4516857	BIG SIDE COVER	1
17	453046900	High pressure stop valve for R410A	1
18	464630000	Side Plate Painting Assy.	1
19	253046	Clip set PVC	1
20	4519188	4 poles terminal block	1
21	4516156	Rear panel Painting assy	1
22	453230000	Connect Plate	1
23	453048400	Condenser assy. (OD7.94x2rows) for DCR 35	1
24	453052700	PATITION	1
25	323156	Motor support assy	1
26	4516158	Cover panel Painting assy	1
27	453031200	Metal motor 27W	1
28	453031000	DC INVERTER CONTROLLER EHK:906-106-00	1
29	452841100	Earth wire	1
30	453129300	Wire UL1007 16AWG/Controller with 250 connector	1

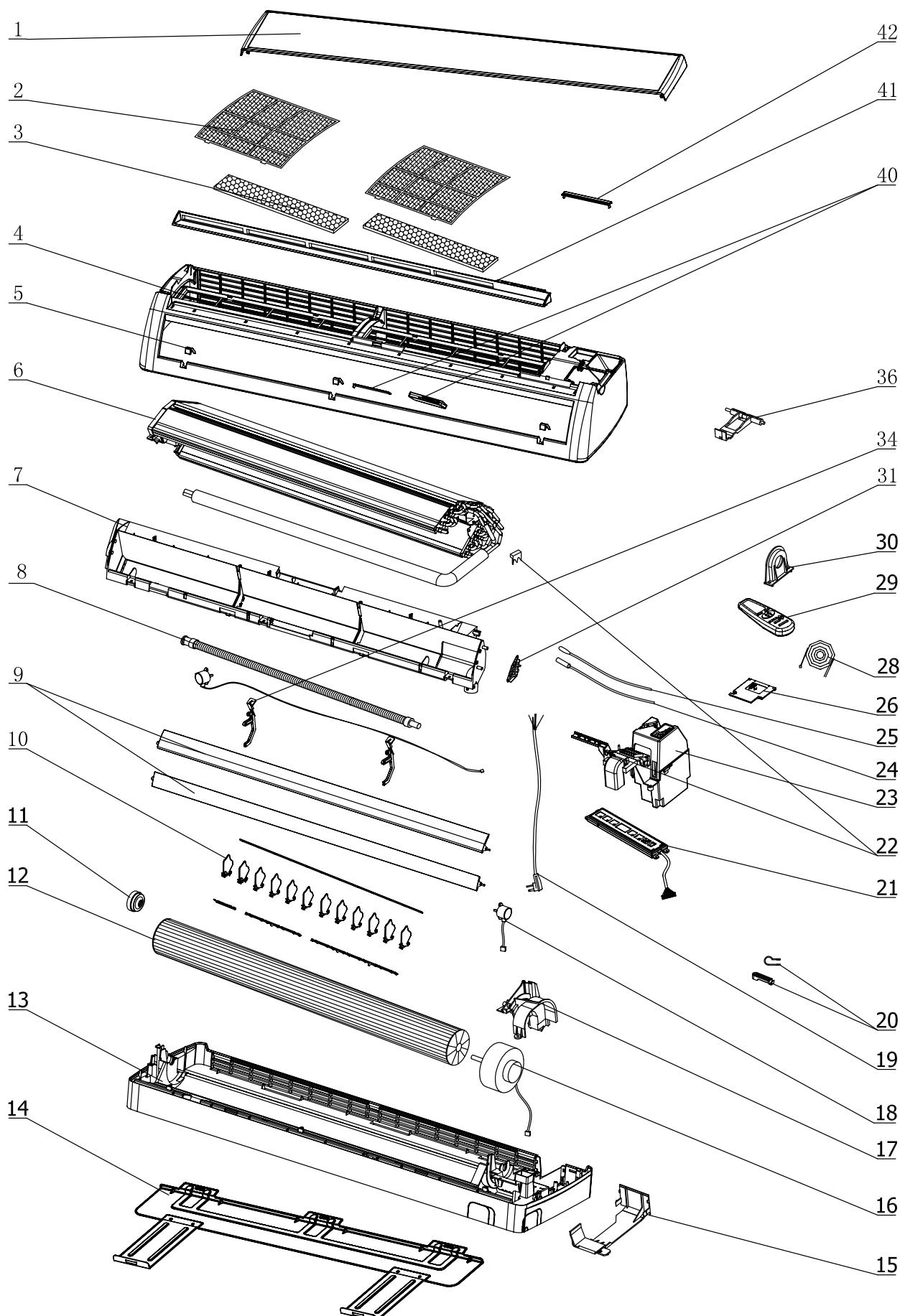
17.8 Outdoor Unit: GCD009 / GCD012

17.9 Outdoor Unit: GCD009

No.	Part No.	Name	Quan.
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	467400040	Sensor/OAT & OMT	1
5	467400200	Compressor top thermistor(CTT)	1
6	467400023	Outdoor coil thermistor(OCT)	1
7	460000032R	Compressor Assy. Toshiba DA89X1C-20FZ3	1
8	453052500	PAINTING BASE ASSY.	1
9	467000001	Compressor Power Cord	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	461600067	4-way valve soldering assy FOR DCR 22/25 Z	1
13	463600050	Capillary Assy FOR DCR 22/25 Z	1
14	461010004	Gas Valve 3/8" R410A	1
15	4516857	BIG SIDE COVER	1
16	461000004	Liquid Valve 1/4" R410A	1
17	464630000	Side Plate Painting Assy.	1
18	204107	Clip set PVC	1
19	4519188	4 poles terminal block	1
20	453230000	Connect Plate	1
21	464800007	Back Guard Net Painting Assy./GCZ	1
22	462300092	Condenser Assy.FOR DCR 22/25 Z R410A	1
23	453052700	PATITION	1
24	453085600	Motor Support	1
25	453085800	Connect Plate/Motor Support	1
26	4516158	Cover panel Painting assy	1
27	453031200R	Metal motor 27W	1
28	467300225R	Controller / DCR 1.6KW OMT	1
29	452841100	Earth wire	1
30	453129300	Wire UL1007 16AWG/Controller with 250 connector	1
31	453085500	Rear Plate/Left	1

17.10 Outdoor Unit: GCD012

No.	Part No.	Name	Quan.
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	467400040	Sensor/OAT & OMT	1
5	467400200	Compressor top thermistor(CTT)	1
6	467400023	Outdoor coil thermistor(OCT)	1
7	460000033R	Compressor Assy. Toshiba DA108X1C-20FZ3	1
8	453052500	PAINTING BASE ASSY.	1
9	467000001	Compressor Power Cord	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	461600068	4-way valve soldering assy FOR DCR 35 Z	1
13	463600051	Capillary Assy FOR DCR 35 Z	1
14	461010004	Gas Valve 3/8" R410A	1
15	4516857	BIG SIDE COVER	1
16	461000004	Liquid Valve 1/4" R410A	1
17	464630000	Side Plate Painting Assy.	1
18	204107	Clip set PVC	1
19	4519188	4 poles terminal block	1
20	453230000	Connect Plate	1
21	464800007	Back Guard Net Painting Assy./GCZ	1
22	462300093	Condenser Assy.FOR DCR 35 Z R410A	1
23	453052700	PATITION	1
24	453085600	Motor Support	1
25	453085800	Connect Plate/Motor Support	1
26	4516158	Cover panel Painting assy	1
27	453031200R	Metal motor 27W	1
28	467300225R	Controller / DCR 1.6KW OMT	1
29	452841100	Earth wire	1
30	453129300	Wire UL1007 16AWG/Controller with 250 connector	1
31	453085500	Rear Plate/Left	1

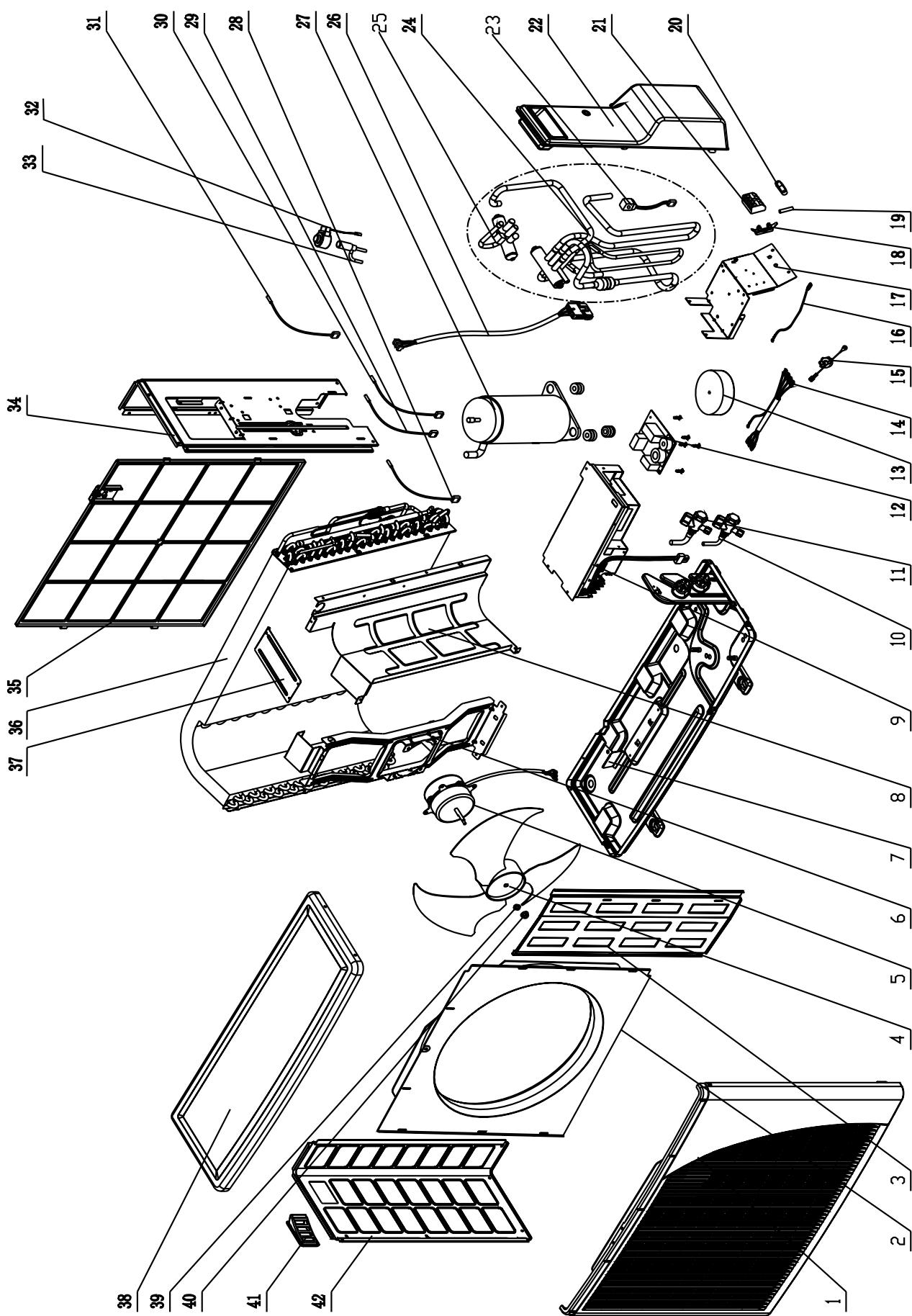
17.11 Indoor Unit: HAD018 / HAD022 / HAD024

17.12 Indoor Unit: HAD018 / HAD022

No.	Part No.	Item Description	Quantity
1	465720378	Front panel Assy./Black/Airwell	1
1	465720379	Front panel Assy./Black/electra	1
1	465720380	Front panel Assy./Black/electra Inverter	1
1	465720381	Front panel Assy./Black/Johnson	1
1	465720382	Front panel Assy./Silver-white/Airwell	1
1	465720383	Front panel Assy./Silver-white/electra	1
1	465720384	Front panel Assy./Silver-white/electra Inverter	1
1	465720385	Front panel Assy./Silver-white/Johnson	1
2	452919800	Filter	2
3	470500012	Nanometer Photocatalysis Deodorant Filter	1
3	470500015	Biological Sterilization Filter	1
4	465720388	Front Frame Assy.	1
5	465340085	Screw Cover/Glossy	3
6	453134600	Evaporator Assy.	1
7	465800111	Air Outlet Frame Assy.	1
8	465210009	Drain Pipe for Europe	1
9	465160023	Horizontal flap A	1
9	465160024	Horizontal flap B	1
10	465160016	Vertical Flap A	12
10	465160017	Vertical Flap B	2
11	4518662	Bearing assy fan	1
12	453024900	Impeller fan	1
13	465700011	Unit Housing Assy	1
14	452920100	Mount bracket	1
15	465320017	Connect Plate	1
16	453024500R	PG Motor	1
17	452918800	Cover/motor	1
18	453050200	STEP MOTOR A	1
18	453050300	STEP MOTOR B	1
19	455013404R	Power Cord/3G/2.5/2100	1
19	455013707R	Power Cord Without Plug/3G/2.5/2100	1
20	453232000	Clip /Power cord	1
21	467300228R	Display Board / HAD	1
22	452919100	Support/sensor	1
22	4516263	SENSOR BASE	1
23	467300258R	Controller / DCI IDU HAD 18	1
24	467400053	ICT Indoor Coil Temperature (RT2) sensor	1
25	467400025	Indoor Air Inlet Temperature Sensor	1
26	465340051	Terminal Cover	1
29	467240025	Remote controller Assy.with batteries. RC-7i-1(RAL9003AW	1
29	467240026	Remote controller Assy.with batteries. RC-7i-1 (BLACK)	1
30	4518651	Cover Side Motor	1
31	453057900	Gear BOX ASSY	1
34	464250070	Support/Horizontal Flap	2
36	465320033	TUBE LOCK	1
40	467480009	Ionizer/Bi-Polar	1
40	465360039	Support/Bi Polar Ionizer	1
40	465340049	Cover/Bi Polar Ionizer	1
41	465160008	Air Inlet Frame A Assy	1
42	465340045	Cover/Front Frame	2

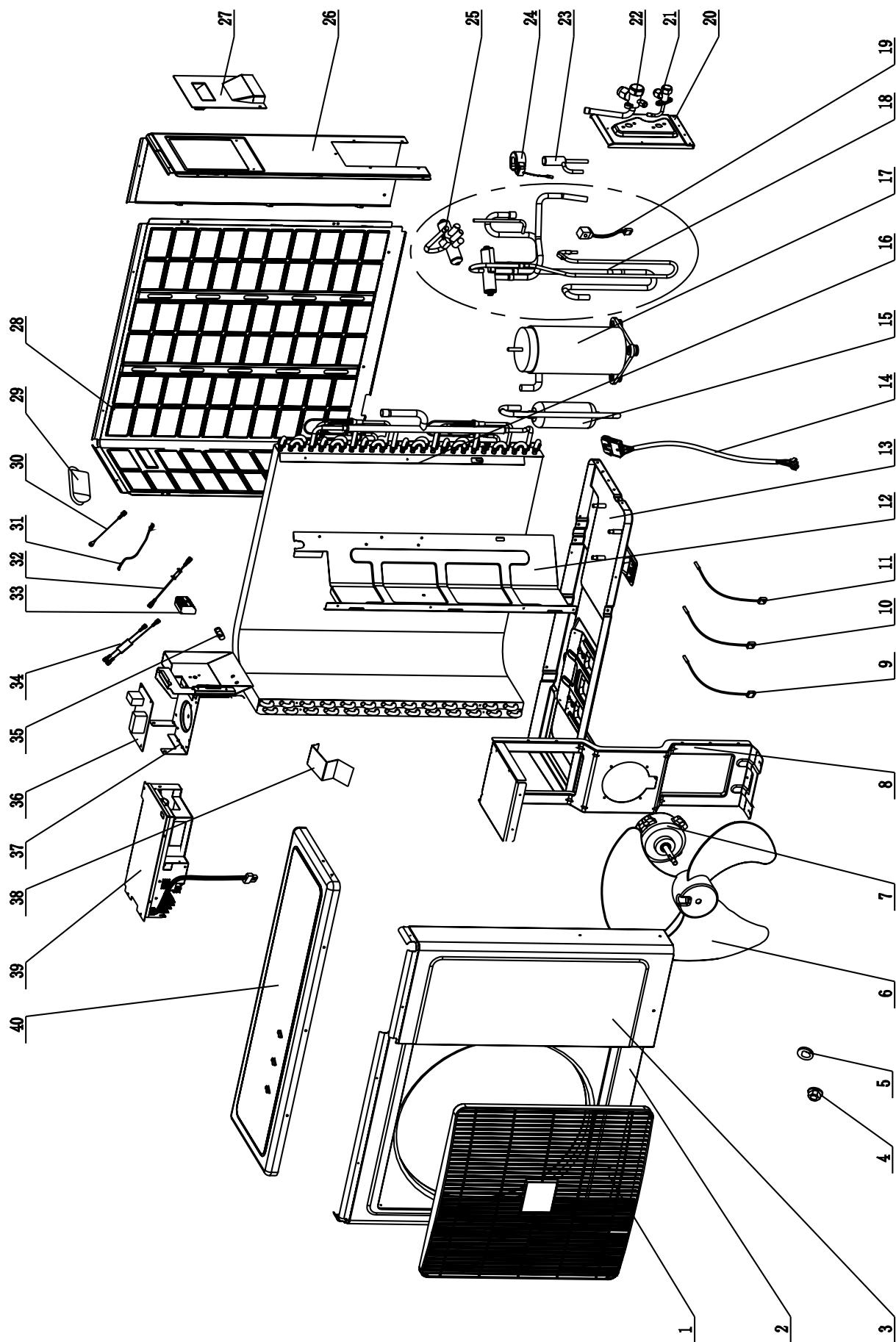
17.13 Indoor Unit: HAD024

No.	Part No.	Item Description	Quantity
1	465720378	Front panel Assy./Black/Airwell	1
1	465720379	Front panel Assy./Black/electra	1
1	465720380	Front panel Assy./Black/electra Inverter	1
1	465720381	Front panel Assy./Black/Johnson	1
1	465720382	Front panel Assy./Silver-white/Airwell	1
1	465720383	Front panel Assy./Silver-white/electra	1
1	465720384	Front panel Assy./Silver-white/electra Inverter	1
1	465720385	Front panel Assy./Silver-white/Johnson	1
2	452919800	Filter	2
3	470500012	Nanometer Photocatalysis Deodorant Filter	1
3	470500015	Biological Sterilization Filter	1
4	465720388	Front Frame Assy.	1
5	465340085	Screw Cover	3
6	453260400	Evaporator Assy	1
7	465800111	Air Outlet Frame Assy.	1
8	465210009	Drain Pipe for Europe	1
9	465160023	Horizontal flap A	1
9	465160024	Horizontal flap B	1
10	465160016	Vertical Flap A	12
10	465160017	Vertical Flap B	2
11	4518662	Bearing assy fan	1
12	453024900	Impeller fan	1
13	465700011	Unit Housing Assy.	1
14	452920100	Mount bracket	1
15	465320017	Connect Plate/Unit housing	1
16	453206800R	DC Motor	1
17	452918800	Cover/motor	1
18	453050200	STEP MOTOR A	1
18	453050300	STEP MOTOR B	1
20	453232000	Clip /Power cord	1
21	467300228R	Display Board	1
22	452919100	Support/sensor	1
22	4516263	SENSOR BASE	1
23	467300259R	Controller	1
24	467400053	ICT Indoor Coil Temperature (RT2) sensor	1
25	467400025	Indoor Air Inlet Temperature Sensor	1
26	465340051	Terminal Cover	1
29	467240025	Remote controller Assy.with batteries. RC-7i-1(RAL9003AW	1
29	467240026	Remote controller Assy.with batteries. RC-7i-1 (BLACK)	1
30	4518651	Cover Side Motor	1
31	453057900	Gear BOX ASSY	1
34	464250070	Support/Horizontal Flap	2
36	465320033	TUBE LOCK	1
40	467480009	Ionizer/Bi-Polar	1
40	465360039	Support/Bi Polar Ionizer	1
40	465340049	Cover/Bi Polar Ionizer	1
41	465160008	Air Inlet Frame A Assy	1
42	465340045	Cover/Front Frame	2

17.14 Outdoor Unit: GC 18 DCI

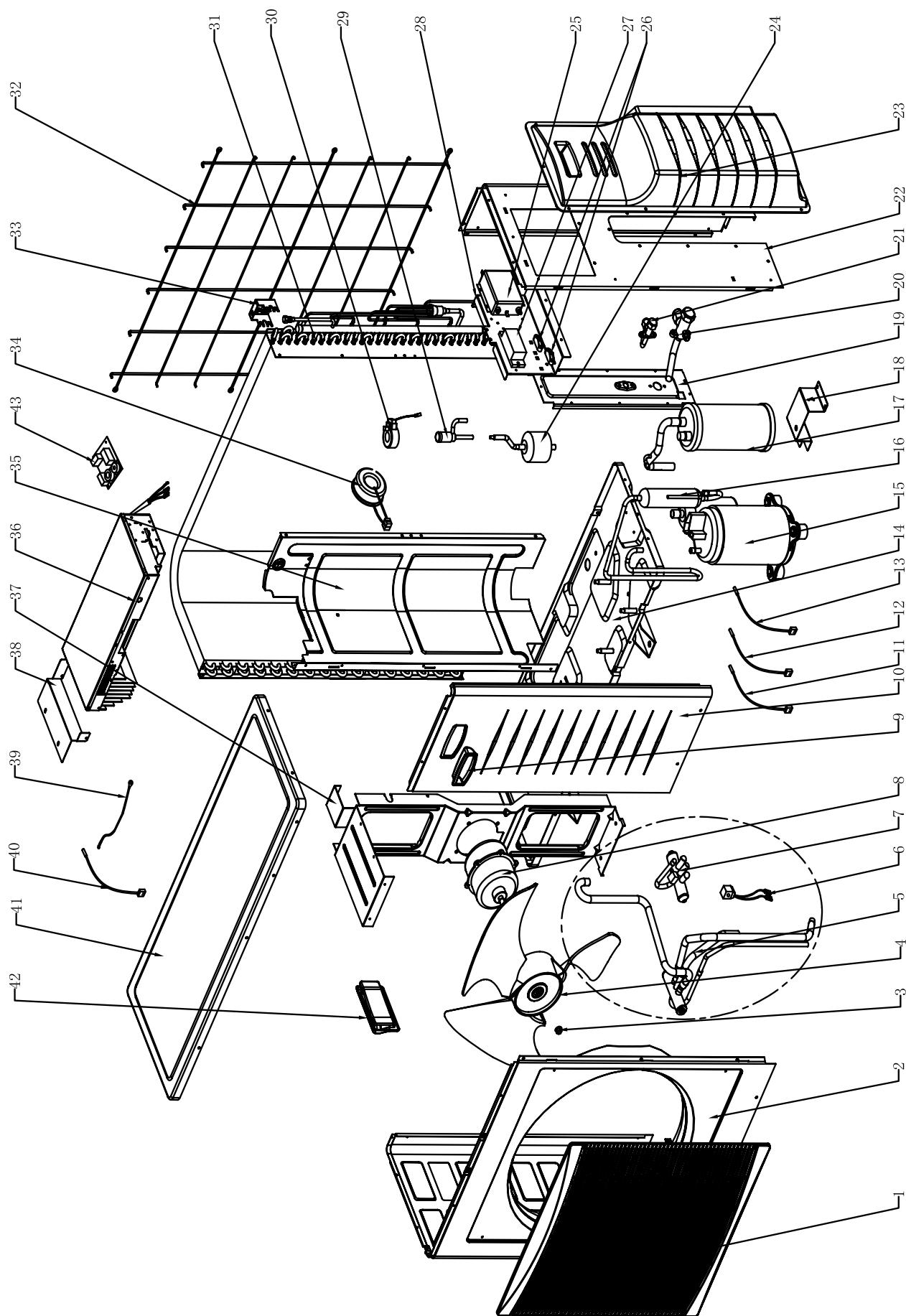
17.15 Outdoor Unit: GC 18 DCI

No.	Item	Description	Quantity
1	433218	Front Panel A	1
2	4526340	Air inlet ring	1
3	464860054	Painting Insulation Plate Assy	1
4	4526476	Axial fan	1
5	452889600R	DC Resin Motor	1
6	4526457	Motor Support	1
7	4527363	Base Painting Assy.	1
8	4526456	Partition	1
9	467300025R	Controller/Outdoor Unit DCI 2.8kW 50(English)	1
10	463300506	Standard Valve Connect Pipe/Gas Valve	1
10	461010005	Gas Valve 1/2 R410A "	1
11	463300560	Connect Pipe/Standard Valve to Liquid Valve	1
11	461000004	Liquid Valve 1/4 R410A "	1
12	467300024R	Filter Board	1
13	4526396R	Choke assy.	1
14	4526223	AC-IN wire	1
15	455015202	ground wire	1
17	4526300	Therminal sheet	1
20	204107	Cable clip Nylon	1
21	4519188	4 poles terminal block	1
22	465340080	Valve Cover	1
23	4522509	4-Way valve coil	1
24	461600060	4-Way Valve Assy.	1
25	4518952	4-W valve	1
26	4526221	Compressor wire	1
27	4523446	Scroll DC compressor assy.	1
28	467400055	Compressor Top Temperature Sensor	1
29	467400026	Outdoor Air Temperature Sensor	1
30	467400056	Outdoor Coil Temperature Sensor	1
32	4526216	EEV COIL QA(L)12-MD-02	1
33	4526215	Electronic expansion valve ZDPF(L)-1.6C-01-RK	1
34	4519606	Right side panel	1
35	433228	Back Side Net	1
36	4526459	Condensor sys. assy.	1
37	4526298	Bridge	1
38	4519614	Painting Top Cover	1
39	4526480	Gasket for axial fan	1
40	4519300	Nut	1
41	433225	Handle	1
42	4519607	Left Side Panel Painting Plate	1

17.16 Outdoor Unit: GC 21 DCI

17.17 Outdoor Unit: GC 21 DCI

No.	Item	Description	Quantity
1	4517144	FAN COVER/GRILL A	1
2	452795700	PAINTED LEFT CABINET ASSY	1
3	4521642	Painted Right Cabinet and Isolation Assy.	1
4	4523141	Hexagon locked nut M10	1
5	4526841	Cusion for fan	1
6	4526510	FAN	1
7	453026500R	DC Motor	1
8	453036400	Motor Support	1
9	467400027	OAT Outdoor Air Temperature Sensor	1
10	467400055	Compressor Top Temperature Sensor	1
11	467400056	Outdoor Coil Temperature Sensor	1
12	464160004	Partition Plate	1
13	453036100	Base Plate Paint Assy.	1
14	4526221	Compressor wire	1
15	453041900	Liquid Accumulator Assy.	1
16	452882900	Condenser and distributor welding assy.	1
17	4523446	Scroll DC compressor assy.	1
18	461600061	4-Way Valve Assy.	1
19	4522509	4-Way valve coil	1
20	4516766	PAINTED VALVE PLATE ASSY	1
21	463300510	Standard Valve Connect Pipe/Liquid Valve	1
21	461000004	Liquid Valve 1/4 R410A "	1
22	463300506	Standard Valve Connect Pipe/Gas Valve	1
22	461010005	Gas Valve 1/2 R410A "	1
23	4526215	Electronic expansion valve	1
24	4526216	EEV COIL	1
25	4518952	4-W valve	1
26	4525938	PAINTED RIGHT-BACK CABINET ASSY	1
27	465220012	Right Lifter	1
28	4517028	PAINTED LEFT-BACK GRILL	1
29	4516758	SMALL HANDLE	1
30	455015203	ground wire	3
31	455015202	ground wire	1
32	453238700	connect Wire	1
33	4519188	4 poles terminal block	1
34	453238600	Wire/Power Input	1
35	204107	Cable clip Nylon	1
36	453048500R	EMI Filter Board	1
37	453052900	Therminal Plate Assy.	1
38	4526585	connect for motor basket	1
39	453030500R	Controller/Outdoor Unit DCI 2.8Kw 60 (English	1
40	4516788	PAINTED TOP COVER ASSY	1

17.18 Outdoor Unit: GC 24 DCI

17.19 Outdoor Unit: GC 24 DCI

No.	Item	Description	Quantity
1	465100000	Grill	1
2	4523652	Painted Left Cabinet ASSY.	1
3	4523758	Nut/left	1
4	452960400	Outdoor Axial Fan	1
5	461600023	4-Way Valve Assy.	1
6	4522509	4-Way valve coil	1
7	4526522	4-WAY VALVE/R410A	1
8	466130002R	DC Resin Motor	1
9	4522601	Right Handle	1
10	4523653	Painted Right Cabinet ASSY.	1
11	467400055	Compressor Top Temperature Sensor	1
12	467400059	Outdoor Coil Temperature Sensor	1
13	467400078	Condenser Coil Temperature Sensor	1
14	452809900	Base Plate Painting Assy.	1
15	460080000R	Compressor Assy.	1
16	452783600	Oil Separator Assy.	1
17	452783200	Liquid-gas Separator	1
18	453256100	Support Painting Support Assy.	1
19	4526080	Valve plate paint assy	1
20	4526513	Low Press Valve(R410A)	1
21	4526514	High press valve(R410A)	1
22	4523654	Painted Right Back Cabinet ASSY.	1
23	465340082	Valve Cover	1
24	4518950	Filter Drier BFK-053S	1
26	204107	Cable clip Nylon	2
27	467420003	7 Poles Terminal Block	1
28	464280001	Terminal Plate	1
29	4526215	Electronic expansion valve	1
30	4526216	EEV COIL	1
31	462300002	Condenser Assy.	1
32	453175500	Guard Net Painting Assy.	1
33	453083800	Support/OAT	1
34	4526396R	Choke assy.901A097-30	1
35	464730006	Partition Plate Assy.	1
36	467300082R	Controller/Outdoor Unit DCI 3.0KW(English)	1
37	464200026	Motor Support	1
38	464250044	Connect Plate/Controller	1
39	455015203	Ground wire	3
39	455015401	Ground wire	2
40	467400027	Outdoor Air Temperature Sensor	1
41	4523657	Painted Top Cover ASSY	1
42	4522600	Left Handle	1
43	467300114R	EMI Filter Board	1

APPENDIX A

INSTALLATION AND OPERATION MANUAL

- ▶ OPERATING MANUAL HAD007/009/012/018/022/024
- ▶ INSTALLATION MANUAL HAD007/009/012/018/022/024